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PATENT ABSTRACTS OF JAPAN

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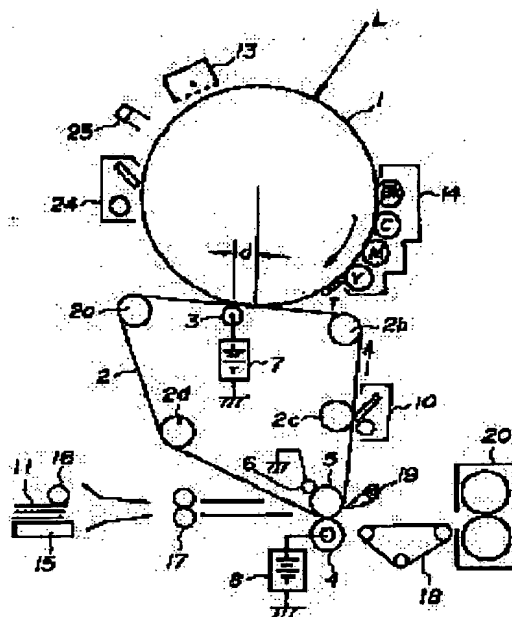
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(54) IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a transferred image of high image quality by arranging a transfer means on the downstream side adjacent to an area where a latent image carrier comes into contact with a belt member.

SOLUTION: A primary transfer roll 3 is separated from the center of the contact part (nip part) of the photoreceptor drum 1 and the intermediate transfer belt 2 by (d) (2 to 4mm) to the downstream s



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CLAIMS

[Claim(s)]

[Claim 1] Latent-image support which forms a latent image according to a picture signal, and a developer which develops said latent image with a predetermined toner, A belt member contacted and arranged in a part at said latent-image support and said latent-image support of said belt member are image formation equipment which possesses at least an imprint means to make a toner image which has been arranged in the opposite side and supported by said latent-image support transfer to said belt member side. Said imprint means Image formation equipment characterized by having arranged on a lower stream of a river close to a surface of action of said latent-image support and said belt member.

[Claim 2] Image formation equipment characterized by installing said imprint means in a location in contact with said belt member in claim 1.

[Claim 3] Image formation equipment characterized by said imprint means being a transfer roller in claim 2.

[Claim 4] Image formation equipment characterized by having arranged said belt member on a share tangent of said latent-image support and said imprint means in claim 3.

[Claim 5] Image formation equipment characterized by installing said imprint means in a location which counters by non-contact [said / belt member and non-contact] in claim 1.

[Claim 6] Image formation equipment characterized by said imprint means being a transfer roller in claim 5.

[Claim 7] Image formation equipment characterized by said imprint means being corotron in claim 5.

[Claim 8] Image formation equipment characterized by making contact pressure of said latent-image support and belt member into 10 thru/or 20 g/cm in claim 1.

[Claim 9] Image formation equipment characterized by setting distance with a center of a point of contact of a center of a point of contact of said latent-image support and said belt member, said belt member, and said imprint means, or a center of the point approaching [non-contact opposite] to 2 thru/or 4mm in claim 1.

[Claim 10] It is image formation equipment characterized by making the belt member concerned come to contact said electrostatic latent-image support by contacting said imprint means by pressing in said belt member while a field where said belt member counters with said electrostatic latent-image support in claim 2 is laid by firm-bridging means in the electrostatic latent-image support concerned and the non-contact condition.

[Claim 11] Image formation equipment characterized by setting a gap of said belt member and said imprint means to less than 100 micrometers in claim 5.

[Claim 12] Image formation equipment characterized by installing a baffle plate which intercepts electric-field invasion to a contact initiation field of said electrostatic latent-image support and said belt member to the migration direction upstream of said belt member of said corotron, and the belt member concerned which counters in claim 7.

[Claim 13] Image formation equipment characterized by constituting said imprint means from a metal roll in claim 11.

[Claim 14] Image formation equipment characterized by having a high resistance resin layer on

the surface of said metal roll in claim 13.

[Claim 15] It sets to claim 3 and a volume-resistivity value of said imprint means is 104. Or 109 Image formation equipment characterized by considering as omega-cm.

[Claim 16] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt Color picture formation equipment characterized by having at least a primary transfer roller by which contact arrangement was carried out with said middle imprint belt which forms imprint electric field between said latent-image support, and imprints said toner image primarily to said middle imprint belt.

[Claim 17] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt Color picture formation equipment characterized by having at least said middle imprint belt with which imprint electric field are formed between said photo conductor drums, and said toner image is primarily imprinted to said middle imprint belt, and a primary transfer roller arranged non-contact.

[Claim 18] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And image formation equipment characterized by having at least a transfer roller by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[Claim 19] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And image formation equipment characterized by having at least said imprint belt with which imprint electric field are formed between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt, and a transfer roller arranged non-contact.

[Claim 20] Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image

with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt Color picture formation equipment characterized by having at least two or more transfer rollers by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said each photo conductor drum, respectively.

[Claim 21] Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt Color picture formation equipment characterized by having at least said imprint belt with which imprint electric field are formed between said each photo conductor drum, respectively, and two or more transfer rollers arranged non-contact.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the image formation equipment which imprints the non-established toner image which was applied to image formation equipments, such as a copying machine of an electrophotography method, and a printer, especially was formed on latent-image support through a direct or belt-like middle imprint object at a record medium to the record medium conveyed by the belt member.

[0002]

[Description of the Prior Art] As the imprint method in image formation equipments, such as a copying machine of an electrophotography method, and a printer The method which imprints directly the toner image formed on latent-image support, such as a photo conductor drum, to the record medium conveyed with a belt-like conveyance object, After imprinting primarily the toner image formed on latent-image support on the middle imprint object which once consists of a belt member of the shape of the shape of a drum, and an endless film, the method which imprints anew the toner image on said middle imprint object secondarily to up to a record medium, and obtains a copy image is learned.

[0003] In addition, in the following explanation, the belt conveyance object of the above, a middle imprint belt, the thing that ****(ed) endless fill in the shape of a drum name generically the member which contacts latent-image support and forms the so-called imprint nip (only henceforth nip), and is also called belt member. Drawing 18 is a mimetic diagram explaining the important section outline structure of the color printer as an example of image formation equipment which used the belt-like middle imprint object as a belt member, and 1 is latent-image support (here). A photo conductor drum, the belt-like middle imprint object whose 2 is a belt member A drive roll, 2b, and 2c (it is hereafter called a middle imprint belt) and 2a A follower roll, A primary transfer roller and 4 a tension roll and 3 2d A secondary transfer roller, The back up roll 5 and 10 which serves as a counterelectrode of the secondary transfer roller 4 while 5 constitutes the circumference conveyance means of the middle imprint belt 2 A middle imprint belt cleaner, The electrification machine in which 11 is uniformly charged with a polar predetermined charge in record media, such as a transfer paper, and 13 photo-conductor drum, and 14 are two or more colors (here). The color developer equipped with each development counter of Black Bk, a cyan C, Magenta M, and Yellow Y, REJIROU for 17 to supply the record medium 11 picked out from the receipt tray of a record medium to predetermined timing to the contact location (secondary imprint section) of the secondary transfer roller 4 and the middle imprint belt 2, It is the electric discharge machine from which 24 removes a photo conductor drum cleaner and 25 removes the surface charge of the photo conductor drum 1.

[0004] In this drawing, the surface of the photo conductor drum 1 is uniformly charged in a polar predetermined charge with the electrification vessel 13, and the electrostatic latent image according to the image of the 1st color (for example, yellow) of the above is formed by the write-in scan of the laser light L modulated with the picture signal of the 1st color. This electrostatic latent image reaches the installation location of a developer 14 in rotation of the photo conductor drum 1, toner development is carried out with the development counter of the

1st color, and a photo conductor drum supports the developed toner image, and rotates further.
 [0005] To compensate for the above-mentioned toner development actuation, the middle imprint belt 2 moves by the peripheral speed and ***** of the photo conductor drum 1. In the primary imprint section which consists of primary transfer rollers 3 arranged in contact with the middle imprint belt 2 directly under the location (nip) where the photo conductor drum 1 and the middle imprint belt 2 contact. With the electrification polarity of the above-mentioned toner impressed to the primary transfer roller 3 concerned, the toner image currently supported by the photo conductor drum 1 by the imprint electric field of reversed polarity is primarily imprinted by the middle imprint belt 2 (primary imprint cycle).

[0006] The toner image primarily imprinted by the middle imprint belt 2 results in the secondary imprint section by which the secondary transfer roller 4 is arranged by circumference migration of the middle imprint belt 2. In the case of a full colour copying machine, the color toner image on top of which the multicolor toner was laid is repeatedly formed on the middle imprint belt 2 by the color (generally yellow:Y, cyan:C, and Magenta:M, black : BK) necessary in from formation of the above-mentioned latent image to the primary imprint of a toner image.

[0007] That is, with color picture formation equipment, generally a developer 14 consists of 4 color development counters of Bk development counter, a cyan development counter, a Magenta development counter, and a yellow development counter, the development counter of each color toner is alternatively located in a development part, or sequential arrangement of the development location is carried out around the photo conductor drum 1 so that the sequential development of the latent image of each color formed in the photo conductor drum 1 can be carried out.

[0008] While removal of a residual toner was made with the latent-image support cleaner 24, after a charge is neutralized by the electric discharge machine 25, as for the photo conductor drum 1 after imprinting the toner image of the 1st color supported by the photo conductor drum 1 on the middle imprint belt 2 in the location of the primary imprint machine 3, formation of the latent image corresponding to the 2nd following color is made. The electrostatic latent image of the 2nd color (for example, Magenta) is developed similarly, and the toner image of the 2nd color is imprinted in piles by the toner image of the 1st color imprinted by the point of the middle imprint belt 2.

[0009] The color toner image which the multiplex imprint was similarly carried out about the 3rd color (cyan) and the 4th color (black) at the middle imprint belt 2, consequently non-established two or more color toner superimposed on the middle imprint belt 2 hereafter is formed (secondary imprint cycle). In addition, the secondary transfer roller 4, the middle imprint object cleaner 10, and an exfoliation pawl are in the location evacuated from the middle imprint belt 2 until the imprint of the last toner image is completed at this time.

[0010] And when the middle imprint belt 2 with which the toner image of all required colors was imprinted primarily arrives at the location of the secondary transfer roller 4, it is taken out from a tray and fed with the record medium 11 which took timing and was sent out by REJIRORU 17 between the middle imprint belt 2 and the secondary transfer roller 4. In case a record medium 11 is pinched with the secondary transfer roller 4, the middle imprint belt 2, and the back up roll 5 and is conveyed, the toner image on the middle imprint belt 2 is secondarily imprinted by the record medium 11 by the imprint electric field formed on the imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner image impressed between the secondary transfer roller 4 and the middle imprint belt 2.

[0011] The secondary transfer roller 4 consists of a conductive material, and predetermined imprint voltage is impressed from the imprint power supply which is not illustrated. For example, an imprint power supply is connected to the secondary transfer roller 4, the contact roll 6 arranged so that it may rotate in contact with the back up roll 4 is connected to touch-down, and an imprint current path is formed. In addition, it is good also as a configuration which connects an imprint power supply to the contact roll 6, and grounds the secondary transfer roller 4 side.

[0012] The record medium 11 with which the toner image was imprinted secondarily exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and is sent to a fixing assembly 20.

When making it pass record-medium 11 between the fixing rolls of a pair, it carries out a record medium 11 heating/pressure treatment, and a fixing assembly 20 fixes a toner image, discharges it on the discharge tray 21, and ends an imaging process. When passing the middle imprint object cleaner 10, removal of a residual toner is made, and the next image formation actuation is equipped with the middle imprint belt 2 which the secondary imprint ended.

[0013] With the color picture formation equipment using such a middle imprint belt 2, since the synthetic toner image (superposition image of each color toner image) with which the multiplex imprint was already made is imprinted by the package to the record medium 11, it has the advantage that generating of the location gap between the toner images in the method which carries out the sequential imprint of the toner image of each color, and an image of turbulence can be prevented effectively, in the direct record medium from the latent-image support 1.

[0014] Conventionally, the thing of a publication is known by JP,6-95521,A as this kind of image formation equipment.

[0015]

[Problem(s) to be Solved by the Invention] In the primary imprint section of the above-mentioned imaging process, the toner image (yellow toner image) first imprinted on the middle imprint belt receives imprint electric field, also when carrying out the sequential imprint of each toner image of the toner image (Magenta) of the 2nd color, the toner image (cyan) of the 3rd color, and the toner image (black) of the 4th color, and for every imprint of the toner image of each above-mentioned color, the amount of electrifications increases and it goes.

[0016] Drawing 19 is explanatory drawing of transition of the amount of electrifications of the toner image of the 1st color (yellow) in the primary imprint cycle on a middle imprint belt. As shown in this drawing, for every activation of a primary imprint of the 2nd subsequent color (Magenta), the 3rd color (cyan), and the 4th color (black), the amount of electrifications rises and the toner image of the yellow which is the 1st color primarily imprinted by the middle imprint belt 2 goes.

[0017] moreover, the toner image of the 2nd color (Magenta) — the yellow image of the 1st color on the middle imprint belt 2 — in piles — or after a portion without the yellow image of the 1st color on a middle imprint belt imprints primarily, the amount of electrifications rises and goes for every activation of a primary imprint of the 3rd color (cyan) and the 4th color (black). Similarly, after the toner image of the 3rd color (cyan) is imprinted primarily, the amount of electrifications rises in response to the imprint electric field at the time of the 4th color (black) primary imprint.

[0018] However, since the toner image of the 4th color (black) of the last color does not have the imprint of other toners, the amount of electrifications at the time of a primary imprint is maintained. Thus, as the color toner image of four colors primarily imprinted on the middle imprint belt 2 was illustrated, max is yellow and the amount of toner electrifications is high in the order of a Magenta, a cyan, and black below.

[0019] Although two or more toner images with which the above-mentioned amounts of electrifications differ will be collectively imprinted to a record medium in a secondary imprint, the optimal imprint voltage to the toner on the middle imprint belt 2 in this secondary imprint changes with amounts of electrifications of a toner. Drawing 20 is explanatory drawing of the amount of toner electrifications on a middle imprint belt, and the relation of optimal secondary imprint voltage, the amount of toner electrifications on a middle imprint belt (micrometer/g) is shown on a horizontal axis, and optimal secondary imprint voltage (kV) is shown on an axis of ordinate.

[0020] As shown in this drawing, the amount of toner electrifications and optimal secondary imprint voltage on a middle imprint belt have the relation of **** direct proportion. That is, it is necessary to make imprint voltage high at the time of the imprint of a toner with the high amount of electrifications, and to make imprint voltage low at the time of the imprint of a toner with the small amount of electrifications. If a secondary imprint is performed on imprint voltage higher than the optimal imprint voltage, imprint current will flow into the toner concerned on the middle imprint belt concerned by the excess of secondary imprint current in a portion with few toners on a middle imprint belt, the electrification polarity of a toner will change, and it will become a

poor imprint.

[0021] On the other hand, if a secondary imprint is performed on imprint voltage lower than the optimal imprint voltage, imprint effectiveness will fall. Thus, with the full color image formation equipment using a middle imprint belt, there was a problem that the optimum conditions of the secondary imprint voltage to two or more toner images could not be set up.

[0022] Moreover, if a transfer roller is just under a photo conductor drum, while an up-and-down vibration occurring in a transfer roller with rotation of a middle imprint belt and a photo conductor drum and being easy to generate imprint unevenness for this vibration Electric field are formed between middle imprint belts and photo conductor drums concerned in the portion (pre nip section) to which a middle imprint belt starts contact to a photo conductor drum, and there is a problem that spilling (Buller) of the toner of photo conductor drum lifting occurs in this electric field.

[0023] What was considered as the configuration which arranges a transfer roller in the periphery lower stream of a river of a photo conductor drum along the conveyance direction of a middle imprint belt as conventional technology for solving the above-mentioned problem in the primary imprint section is indicated by JP,6-95536,A. That is, if a transfer roller is arranged in the periphery lower stream of a river of a photo conductor drum along the conveyance direction of a middle imprint belt in a primary imprint, an exfoliation discharge phenomenon in case a photo conductor drum and a middle imprint belt exfoliate will increase, and the amount of electrifications of the toner on the middle imprint belt after an imprint will increase.

[0024] Drawing 21 is a mimetic diagram explaining the physical relationship of the photo conductor drum in the primary imprint section indicated by the above-mentioned conventional technology, a middle imprint belt, and a primary transfer roller, and, as for a photo conductor drum and 2, 1 is [a middle imprint belt and 3] primary transfer rollers. The primary transfer roller 3 is installed so that ** thickness may be carried out [from the contact section of the photo conductor drum 1 and the middle imprint belt 3] to the portion which shifted only the angle theta on the direction lower stream of a river of a periphery of the photo conductor drum concerned on both sides of the middle imprint belt 2 on the photo conductor drum 1 with the photo conductor drum 1 concerned.

[0025] By arranging a primary transfer roller as mentioned above, an exfoliation discharge phenomenon in case the middle imprint belt 2 separates from the photo conductor drum 1 increases, and the amount of electrifications of the toner on the middle imprint belt 2 increases by this exfoliation discharge. According to this configuration, the amount of electrifications of the black toner of the last color also increases, and even if it sets secondary imprint voltage as 1.6kV, imprint nature with a yellow toner to a good black toner can be obtained.

[0026] However, since a middle imprint belt with tension is sagged with the configuration of drawing 21 , with it, primary imprint nip pressure will become high. It is explanatory drawing of the relation between the nip pressure of a middle imprint belt and a photo conductor drum, and imprint quality, and nip pressure (g/cm) is taken along a horizontal axis, it takes the grade of imprint quality along an axis of ordinate, and drawing 22 is shown.

[0027] If the nip pressure of a middle imprint belt and a photo conductor drum becomes large as the continuous line showed to this drawing, generating of a poor inside omission imprint will also increase. Moreover, if nip pressure is made lower than a certain value, as this drawing dotted line showed, generating of imprint unevenness will increase. Moreover, since the imprint member is installed directly under the nip of a photo conductor drum and a middle imprint belt, vibration occurs in an imprint member with contacting-by-pressing migration of a photo conductor drum and a middle imprint belt, the vibration induces fluctuation of said nip pressure, and imprint unevenness occurs.

[0028] Furthermore, the electric field from an imprint member reach the upstream region (pre nip section) close to the nip section of a photo conductor drum and a middle imprint belt, and this causes [of a toner / of scattering (the so-called Buller)] generating, and brings about image quality deterioration. In addition, although only the method which imprints the toner image formed in latent-image support above to a record medium through a middle imprint belt was explained The color picture formation equipment of the method which puts on the record medium which

carries out installation adsorption of each of the multicolor toner image formed in two or more latent-image support, respectively at a form conveyance belt, and is conveyed to a tandem one by one, and is imprinted, And also in image formation equipments, such as monochrome of the method which the shape of a belt, the film up, etc. contact the imprint belt (belt member) according to this to latent-image support, such as not only a color but a photo conductor drum, and imprints the imprint of a toner image to a direct record medium, it is the same.

[0029] As mentioned above, in a Prior art, since the imprint means is installed directly under [nip] latent-image support and a belt member, vibration occurs in an imprint member with contacting-by-pressing migration of latent-image support and a belt member, this brings about fluctuation of nip pressure and imprint unevenness occurs. Furthermore, the electric field from an imprint member reached the upstream close to the nip section of latent-image support and a belt member, this caused [of Buller] generating, and there was a problem of bringing about image quality deterioration.

[0030] Furthermore, with full color image formation equipment, since the amount of electrifications of the toner of two or more colors was different, there was a problem that a setup of the optimal imprint voltage became difficult. The purpose of this invention is to solve many problems of the above-mentioned conventional technology, cancel a middle imprint object and the poor imprint in the method using the belt member as a record-medium conveyance member or an imprint means, and offer the image formation equipment which can obtain a high-definition transfer picture.

[0031]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the 1st invention according to claim 1 Latent-image support which forms a latent image according to a picture signal, and a developer which develops said latent image with a predetermined toner, A belt member contacted and arranged in a part at said latent-image support and said latent-image support of said belt member are image formation equipment which possesses at least an imprint means to make a toner image which has been arranged in the opposite side and supported by said latent-image support transfer to said belt member side. Said imprint means It is characterized by having arranged on a lower stream of a river close to a surface of action of said latent-image support and said belt member.

[0032] Moreover, 2nd invention according to claim 2 is characterized by installing said imprint means in the 1st invention in a location in contact with said belt member. Furthermore, 3rd invention according to claim 3 is characterized by said imprint means in the 2nd invention being a transfer roller. Furthermore, 4th invention according to claim 4 is characterized by having arranged said belt member in the 3rd invention on a share tangent of said latent-image support and said imprint means.

[0033] While vibration of imprint means, such as a transfer roller, is controlled by this configuration, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, 5th invention according to claim 5 is characterized by installing said imprint means in the 1st invention in a location which counters by non-contact [said / belt member and non-contact].

[0034] Furthermore, 6th invention according to claim 6 is characterized by said imprint means in the 5th invention being a transfer roller. Furthermore, 7th invention according to claim 7 is characterized by said imprint means in the 5th invention being corotron. By the configuration of the above 5th thru/or the 7th invention, the same effect as said the 2nd thru/or 4th invention is acquired.

[0035] Furthermore, 8th invention according to claim 8 is characterized by making contact pressure of said latent-image support and belt member in the 1st invention into 10 thru/or 20 g/cm. Furthermore, 9th invention according to claim 9 is characterized by setting distance with a center of a point of contact of a center of a point of contact of said latent-image support in the 1st invention, and said belt member, said belt member, and said imprint means, or a center of the point approaching [non-contact opposite] to 2 thru/or 4mm.

[0036] The nip section and an imprint means for controlling Buller's generating by the

configuration of the above 8th and the 9th invention, while preventing generating of imprint nonuniformity are arranged in the optimal location, and a high-definition image can be formed. Furthermore, 10th invention according to claim 10 is characterized by the belt member concerned making said electrostatic latent-image support contact by contacting said imprint means by pressing in said belt member while said electrostatic latent-image support and a field which counters lay said belt member in the 2nd invention with a firm-bridging means in the electrostatic latent-image support concerned and the non-contact condition.

[0037] By this configuration, the optimal nip pressure of latent-image support and a belt member is set up easily, and a high-definition image can be formed. Furthermore, 11th invention according to claim 11 is characterized by setting a gap of said belt member in the 5th invention, and said imprint means to less than 100 micrometers. By this configuration, discharge between said belt members and said imprint means can be controlled, and a high-definition image without image turbulence can be obtained.

[0038] Furthermore, 12th invention according to claim 12 is characterized by installing a baffle plate in the migration direction upstream of said belt member of said corotron in the 7th invention, and the belt member concerned which counters. Electric-field invasion to a contact initiation field of said electrostatic latent-image support and said belt member is intercepted by this configuration, image turbulence by electric-field invasion in the pre-nip section is called off, and a high-definition image can be obtained.

[0039] Furthermore, 13th invention according to claim 13 is characterized by constituting said imprint means in the 11th invention from a metal roll. In this configuration, surface process tolerance of a metal roll can be improved and an installation gap between belt members can be set as a precision because said imprint means considers as a metal roll.

[0040] Furthermore, 14th invention according to claim 14 is characterized by having a high resistance resin layer on the surface of said metal roll in the 13th invention. Image quality deterioration which can avoid discharge between belt members and originates in generating of discharge in the imprint section by this configuration is controlled. Furthermore, the 15th invention according to claim 15 is a volume-resistivity value of said imprint means in the 3rd invention 104 Or 109 It is characterized by considering as omega-cm.

[0041] By this configuration, discharge between belt members can be avoided with applied voltage for forming imprint electric field, and high-definition image formation becomes possible. Furthermore, the 16th invention according to claim 16 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt It is characterized by having at least a primary transfer roller by which contact arrangement was carried out with said middle imprint belt which forms imprint electric field between said latent-image support, and imprints said toner image primarily to said middle imprint belt.

[0042] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0043] A middle imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum which supported a developed toner image, it carries out the sequential imprint of the toner image of each color by which sequential formation was carried out for every color at said photo conductor drum, and supports it as a full color toner image. A secondary

transfer roller carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium.

[0044] By being arranged on a lower stream of a river close to a surface of action of latent-image support and said middle imprint belt, and impressing the electrification polarity of a toner image, and polar voltage of reverse in contact with a rear face of a toner image support side of a middle imprint belt, a primary transfer roller forms imprint electric field between photo conductor drums, and imprints a toner image primarily to said middle imprint belt. While vibration of a primary transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and a middle imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible.

[0045] Furthermore, the 17th invention according to claim 17 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt It is characterized by having at least said middle imprint belt with which imprint electric field are formed between said photo conductor drums, and said toner image is primarily imprinted to said middle imprint belt, and a primary transfer roller arranged non-contact.

[0046] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0047] A middle imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum which supported a developed toner image, it carries out the sequential imprint of the toner image of each color by which sequential formation was carried out for every color at said photo conductor drum, and supports it as a full color toner image. A secondary transfer roller carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium.

[0048] A primary transfer roller is arranged on a lower stream of a river close to a surface of action of latent-image support and said middle imprint belt, and forms imprint electric field between photo conductor drums by being arranged in a non-contact location at a rear face of a toner image support side of a middle imprint belt, and impressing the electrification polarity of a toner image, and polar voltage of reverse, and imprints a toner image primarily to said middle imprint belt.

[0049] While vibration of a primary transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and a middle imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 18th invention according to claim 18 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And it is

characterized by having at least a transfer roller by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0050] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0051] An imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum, and it conveys a record medium which imprints said predetermined toner image formed in said photo conductor drum. A transfer roller forms imprint electric field between said photo conductor drums by arranging on a lower stream of a river close to a surface of action of a photo conductor drum and said imprint belt, and impressing the electrification polarity of said toner image, and polar voltage of reverse in contact with a rear face of a record-medium installation side of an imprint belt.

[0052] While vibration of a transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and an imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 19th invention according to claim 19 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And it is characterized by having at least said imprint belt with which imprint electric field are formed between said photo conductor drums, and a transfer roller arranged non-contact by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0053] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0054] An imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum, and it conveys a record medium which imprints said predetermined toner image formed in said photo conductor drum. A transfer roller is arranged on a lower stream of a river close to a surface of action of a photo conductor drum and said imprint belt, and is arranged by non-contact at the rear face of a record-medium installation side of an imprint belt, and forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse.

[0055] While vibration of a transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and an imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 20th invention according to claim 20 Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It

arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And it is characterized by having at least two or more transfer rollers by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said each photo conductor drum, respectively by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0056] In this configuration, two or more photo conductor drums form a latent image according to one each of the picture signals of two or more colors. Two or more color developers are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner. An imprint belt is conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of a photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one.

[0057] Two or more transfer rollers form imprint electric field between said each photo conductor drum, respectively by arranging on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt, and impressing the electrification polarity of said toner image, and polar voltage of reverse in contact with a rear face of a record-medium installation side of said imprint belt. While vibration of each transfer roller in accordance with contacting-by-pressing migration with each photo conductor drum and an imprint belt is controlled by this, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in each pre nip section, and high-definition image formation becomes possible.

[0058] Furthermore, the 21st invention according to claim 21 Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And it is characterized by having at least said imprint belt with which imprint electric field are formed between said each photo conductor drum, respectively, and two or more transfer rollers arranged non-contact by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0059] In this configuration, two or more photo conductor drums form a latent image according to one each of the picture signals of two or more colors. Two or more color developers are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner. An imprint belt is conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of a photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one.

[0060] Two or more transfer rollers are arranged on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt, and are arranged by non-contact at the rear face of a record-medium installation side of said imprint belt, and form imprint electric field between said each photo conductor drum by impressing the electrification polarity of said toner image, and polar voltage of reverse, respectively. While vibration of each transfer roller in accordance with contacting-by-pressing migration with each photo conductor drum and an imprint belt is controlled by this, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in each pre nip section, and high-definition image formation becomes possible.

[0061] In addition, although a photo conductor drum which is the latent-image support in the above 16th thru/or the 21st invention is the drum-like member which generally covered a photo

conductor nature material which forms an electrostatic latent image with a scan of light, such as laser light, a thing of format which forms a latent image with not only the above but the magnetic head or an ion arm head as latent-image support is sufficient as it. Moreover, although a belt member which can be set they to be [any of the above-mentioned invention] is also an endless belt-like member over which it generally built among two or more rolls, what was considered as a configuration which does not restrict to this and was supported in the shape of a drum may be used.

[0062] Furthermore In color picture formation equipment of format which piles up a toner image of two or more colors which two or more latent-image support (photo conductor drum) was made to support, respectively one by one, and imprints it according to conveyance of the imprint belt concerned on record media, such as a transfer paper which lays on an imprint belt in said the 20th thru/or 21st invention, and is conveyed Although considered as a configuration which arranges an imprint means to constitute the imprint section of all photo conductor drums, on a nip section lower stream of a river what restricts this invention to this — it is not — the 1, 2, or 3 — or it is good also as a configuration which arranges only an imprint member (a transfer roller or corotron) which imprint electric field arrange in the nip section of the high last imprint part on the nip section lower stream of a river concerned.

[0063] By having arranged a transfer roller which imprints a toner image supported by latent-image support to the downstream of a contact part (nip) with imprint objects, such as the latent-image support concerned, a middle imprint object belt, or an imprint belt, according to this invention Exfoliation discharge in a field which leaves the above-mentioned imprint object and latent-image support becomes large, the amount of electrifications of the last imprint toner with few amounts of electrifications increases in two or more imprinted toner images, and the poor imprint at the time of a secondary imprint to a record medium or a direct imprint to a record medium is prevented.

[0064] And since a surface of action of latent-image support, a middle imprint object, or an imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission.

[0065]

[Embodiment of the Invention] Hereafter, with reference to an example, it explains to details about the gestalt of operation of this invention. Drawing 1 is a mimetic diagram explaining the important section outline structure of the color printer as the first example of the color picture formation equipment by this invention which used the belt-like middle imprint object, the same sign as said drawing 18 corresponds to the same portion, and, for a primary imprint power supply and 8, as for a tray and 16, a secondary imprint power supply and 15 are [6 / a contact roll and 7 / the pick up roll and 17] REJIROU.

[0066] In this drawing, the surface of the photo conductor drum 1 is uniformly charged in a polar predetermined charge with the electrification vessel 13, and the electrostatic latent image according to the image of the 1st color (for example, yellow) of the above is formed by the write-in scan of the laser light L modulated with the picture signal of the 1st color. This electrostatic latent image reaches the installation location of a developer 14 in rotation of the photo conductor drum 1, toner development is carried out with the development counter of the 1st color, and a photo conductor drum supports the toner image by which the lower image was carried out, and rotates further.

[0067] To compensate for the above-mentioned toner development actuation, the middle imprint belt 2 moves by the peripheral speed and ***** of the photo conductor drum 1, and the toner image with which the electrification polarity of the above-mentioned toner impressed to the primary transfer roller 3 from the primary imprint power supply 7 in the primary imprint section which the photo conductor drum 1 and the middle imprint belt 2 contact was supported by the photo conductor drum 1 by the imprint electric field of reversed polarity is primarily imprinted by the middle imprint belt 2 (primary imprint cycle).

[0068] The primary transfer roller 3 is installed in the portion which estranges only d (2 thru/or 4mm) to the downstream of the middle imprint object belt 2 concerned from the center of a contact portion (nip section) of the photo conductor drum 1 and the middle imprint object belt 2,

and touches only the middle imprint object belt 2 concerned. It is set as 10 thru/or 20 g/cm, the pressure, i.e., the nip pressure, of the above-mentioned nip section. The toner image primarily imprinted by the middle imprint belt 2 results in the secondary imprint section by which the secondary transfer roller 4 is arranged by circumference migration of the middle imprint belt 2.

[0069] In the case of a full colour copying machine, the color toner image on top of which the multicolor toner was laid is repeatedly formed on the middle imprint belt 2 by the color (generally yellow:Y, cyan:C, and Magenta:M, black : BK) necessary in from formation of the above-mentioned latent image to the primary imprint of a toner image. That is, with color picture formation equipment, generally a developer 14 consists of 4 color development counters of a cyan development counter, a Magenta development counter, a yellow development counter, and Bk development counter, the development counter of each color toner is alternatively located in a development part, or sequential arrangement of the development location is carried out around the photo conductor drum 1 so that the sequential development of the latent image of each color formed in the photo conductor drum 1 can be carried out.

[0070] While removal of a residual toner was made with the latent-image support cleaner 24, after a charge is neutralized by the electric discharge machine 25, as for the photo conductor drum 1 after imprinting the toner image of the 1st color supported by the photo conductor drum 1 on the middle imprint belt 2 in the location of the primary imprint machine 3, formation of the latent image corresponding to the 2nd following color is made. The electrostatic latent image of the 2nd color (for example, Magenta) is developed similarly, and the toner image of the 2nd color is imprinted in piles by the toner image of the 1st color imprinted by the point of the middle imprint belt 2.

[0071] The color toner image which the multiplex imprint was similarly carried out about the 3rd color (cyan) and the 4th color (black) at the middle imprint belt 2, consequently non-established two or more color toner superimposed on the middle imprint belt 2 hereafter is formed (secondary imprint cycle). In addition, the secondary transfer roller 4, the middle imprint object cleaner 10, and an exfoliation pawl are in the location evacuated from the middle imprint belt 2 until the imprint of the last toner image is completed at this time.

[0072] And when the middle imprint belt 2 with which the toner image of all required colors was imprinted primarily arrives at the location of the secondary transfer roller 4, it is taken out from a tray 15 and fed with the record medium 11 which took timing and was sent out by REJIORU 17 between the middle imprint belt 2 and the secondary transfer roller 4. In case a record medium 11 is pinched with the secondary transfer roller 4, the middle imprint belt 2, and the back up roll 5 and is conveyed, the toner image on the middle imprint belt 2 bundles up to a record medium 11 by the imprint electric field formed between the secondary transfer roller 4 and the middle imprint belt 2 on the imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner image impressed from the secondary imprint power supply 8, and it imprints secondarily.

[0073] The record medium 11 with which the toner image was imprinted secondarily exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and is sent to a fixing assembly 20 with the record-medium conveyance belt 18. When making it pass record-medium 11 between the fixing rolls of a pair, a fixing assembly 20 discharges a record medium 11 on heating / discharge tray which carries out pressure treatment, and does not fix and illustrate a toner image, and ends an imaging process.

[0074] When passing the middle imprint object cleaner 10, removal of a residual toner is made, and the next image formation actuation is equipped with the middle imprint belt 2 which the secondary imprint ended. Drawing 2 is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the color picture formation equipment by this invention which used the belt-like middle imprint object, and the same sign as drawing 1 corresponds to the same portion.

[0075] In this drawing, the toner image T charged in minus polarity with the developer 14 is formed in the surface of the photo conductor drum 1. For the middle imprint object belt 2, it consists of polyimide system resin, and the thickness is 60-90 micrometers, and a volume resistivity is 10⁹-10¹². Omega-cm and surface resistivity are the resin films of half-conductivity

adjusted to 1011-1013ohms / **.

[0076] This middle imprint object belt 2 is usable if thickness, a volume resistivity, and surface resistivity are the semiconductor nature resin materials which are in the range of the above-mentioned value, in addition the thing which made acrylic resin, vinyl chloride system resin, polyester system resin, or polycarbonate system resin contain a resistance stabilizing material can also be used for it. Now, in other words, the middle imprint object belt 2 in the primary imprint section is arranged on the tangent of the surface of the photo conductor drum 1. That is, most contact force to the photo conductor drum 1 by **** of the middle imprint object belt 2 is set to 0. Contact pressure will become very high if the lap of the middle imprint object belt 2 is carried out to the photo conductor drum 1.

[0077] The contact pressure of the photo conductor drum 1 and the middle imprint object belt 2 in the primary imprint section is obtained by pushing up above the drawing with the spring which does not illustrate the primary transfer roller 3. If 10 - 20 g/cm is suitable for this pressure and its contact pressure is higher than this, a poor inside omission imprint will generate it. Moreover, if contact pressure is low, imprint unevenness will arise.

[0078] Therefore, the contact width of face (nip width of face) of the middle imprint object belt 2 and the photo conductor drum 1 is set to about 0.5-2mm. The primary transfer roller 3 is arranged on the direction lower stream of a river of 2-4mm process from the center of contact width of face of the photo conductor drum 1 and the middle imprint object belt 2. Imprint current is transmitted from the primary transfer roller 3 to the middle imprint object belt 2 of half-conductivity, and an imprint operation is performed by flowing into the surface of action of the photo conductor drum 1 and the middle imprint object belt 2.

[0079] Although positive voltage is impressed to the primary transfer roller 3 in order to imprint the minus electrification toner image of the upstream of the photo conductor drum 1, it is more desirable for control of imprint electric field to adopt constant current control, since there are dispersion in resistance of the primary transfer roller 3, dispersion of resistance of the middle imprint object belt 2, dispersion of electrification of a toner, etc. In this example, imprint nature with imprint current good at 15-25microA was obtained.

[0080] The volume resistivity of the primary transfer roller 3 is 104-109. Omega-cm is suitable, the material is foaming elastic sponge-like silicone rubber, and the degree of hardness used the 25 degrees - 45 degrees (Aska C measurement) thing. in addition, the material of the primary transfer roller 3 — in addition, materials, such as EPDM and polyurethane, can also be used if each above-mentioned value is satisfied.

[0081] In this example, the path of 20mm and the photo conductor drum 1 of the path of the primary transfer roller 3 is 84mm. With the above-mentioned configuration, if a primary imprint is performed, primary imprint voltage impressed to the secondary transfer roller 3 in a secondary imprint will be set to plus 1.6kV, and a good image will be obtained. This is because the amount of electrifications of black which is the last color is stable from the yellow whose toner image on the middle imprint belt 2 is the 1st color.

[0082] The imprint electric-field field in the portion into which a middle imprint belt exfoliates from the photo conductor drum in the primary imprint section is from a primary transfer roller to the contact section of a photo conductor drum and a middle imprint belt, in the above-mentioned exfoliation section, exfoliation electric field become strong, and stabilization of the above-mentioned amount of electrifications is because the amount of electrifications of the toner image on a middle imprint belt increases by the exfoliation discharge. Moreover, if the distance of the primary transfer roller 3 and the middle imprint object belt 2 is less than 100 micrometers, even when both are made non-contact, good imprint nature will be obtained.

[0083] The mimetic diagram explaining the important section outline structure of the color printer as the second example of the color picture formation equipment by this invention for which drawing 3 used the belt-like middle imprint object, and drawing 4 are the important section mimetic diagrams explaining the details configuration of the primary imprint portion of the second example, and the same sign as drawing 1 corresponds to the same portion. This example is the same configuration as said drawing 1 except for the configuration which has arranged the primary transfer roller 3 by non-contact at the rear face of the middle imprint belt 2.

[0084] In this example, the primary transfer roller 3 is arranged by non-contact from the center of the nip section on 2 thru/or 4mm lower stream of a river, and it is installed in a non-contact location so that distance with the middle imprint object belt 2 may be set to less than 100 micrometers. The primary transfer roller 3 at this time is constant current control, and should just set a current value to 15-25microA.

[0085] High-definition image formation becomes possible like [this example] the 1st example of the above. The mimetic diagram explaining the important section outline structure of the color printer as the third example of the color picture formation equipment by this invention for which drawing 5 used the belt-like middle imprint object, and drawing 6 are the important section mimetic diagrams explaining the details configuration of the primary imprint portion of the third example, and the same sign as drawing 3 corresponds to the same portion.

[0086] This example is the same configuration as said drawing 3 except for the configuration which has arranged corotron 3' by non-contact at the rear face of the middle imprint belt 2 as a primary imprint means. In this example, corotron 3' is arranged by non-contact from the center of the nip section on 2 thru/or 4mm lower stream of a river. High-definition image formation becomes possible like [this example] the 1st example of the above.

[0087] Drawing 7 is a mimetic diagram explaining the whole color picture formation equipment configuration by this invention, and has the configuration of said drawing 1 using a belt-like middle imprint object. In addition, the whole image formation equipment configuration corresponding to said third example and the fourth example is the same except for the portion of a primary imprint means. For 40, as for the picture signal processing section and 60, in this drawing, the laser write-in section and 50 are [the imaging section and 70] imaging control sections.

[0088] The laser write-in section 40 consists of laser 41, the image formation optical system 42, scan optical system 43, and a mirror 44, and laser 41 carries out outgoing radiation of the laser light L modulated with the picture signal of each color which performed signal processing, such as various kinds of amendments in the picture signal processing section 50. The imaging section 60 has the photo conductor drum 1, the middle imprint belt 2, the primary transfer roller 3, and the secondary transfer roller 4, and the latent-image support electrification machine (corotron) 13, the color developer, the latent-image support cleaner 24, and the electric discharge machine 25 are installed around the photo conductor drum. Moreover, the middle imprint belt 2 goes around to drive roll 2a, follower roll 2b, and tension roll 2d and the back up roll 5, and carries out conveyance migration.

[0089] The imprint current path which is arranged so that the contact roll 6 may carry out contact rotation at the back up roll 5, and results in the layered product → back-up-roll 5 → contact roll 6 → touch-down of a **** cage, the imprint power supply 8 → secondary transfer roller 4 → record medium 11, and the middle imprint belt 2 is constituted. After the last toner image of the toner image of each color with which a photo conductor 1 constitutes a color picture is primarily imprinted on the middle imprint belt 2, the middle imprint belt 2 is conveyed to the secondary imprint part to which the secondary transfer roller 4 is arranged.

[0090] On the other hand, a record medium 11 is taken out from a tray 15 by the pick up roll 16 addressing picking to one sheet, it stands by by REJIROU 17, and a record medium 11 also advances into coincidence at the above-mentioned nip section to the timing to which the multicolor toner image supported by the above-mentioned middle imprint belt 2 advances into the nip section of the secondary transfer roller 4 and the middle imprint belt 2. In the secondary imprint section, imprint current flows to the above-mentioned imprint current path with the secondary imprint voltage impressed from the imprint power supply 8, and the multicolor toner image supported by the middle imprint belt 2 is collectively imprinted to a record medium 11.

[0091] The record medium 11 with which the multicolor toner image was imprinted exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and after being carried in to a fixing assembly 20 with the storage conveyance belt 18 and carrying out fixing processing, it is discharged by the discharge tray 21. Moreover, with the middle imprint object cleaner 10, removal of a residual toner is performed and the following imprint process is equipped with the middle imprint belt 2 which imprinted the toner image to the record medium 11.

[0092] Thus, the multicolor toner image which carried out the multiplex imprint can be imprinted good on a middle imprint belt at a record medium, and the color picture of high quality can be obtained. Since the surface of action of a photo conductor drum and a middle imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission. Moreover, vibration of a transfer roller is controlled like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made.

[0093] Drawing 8 is a mimetic diagram explaining the important section configuration of the fourth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium, and, as for a photo conductor drum and 2', 1 is [an imprint belt and 3] transfer rollers. Around the photo conductor drum 1, the developer 14 which develops the latent image formed in the latent-image support electrification machine (corotron) 13 for electrifying the surface of the photo conductor drum concerned with a uniform charge and the photo conductor drum 1, the latent-image support cleaner 24, and the electric discharge machine 25 grade are arranged.

[0094] an imprint — a belt — two — ' — said — the — one — an example — being the same — a material — constituting — having — a drive roll — two — a — ' — a follower — a roll — 2b — ' — a tension roll — two — c — ' — building — having — an arrow head — a direction — conveying — having . moreover, 11 is a record medium, and the record medium 11 picked out from the tray which is not a drawing example stands by by REJIORU 17, and is carried in to this nip to the timing which the toner image formed in the photo conductor drum 1 rotates in the imprint section (the contact section of the photo-conductor drum 1 and imprint belt 2': nip section) in which the transfer roller 3 was installed.

[0095] From the nip portion of the photo conductor drum 1 and imprint belt 2', a transfer roller 3 contacts the rear face of imprint belt 2', and is arranged at it in the location which estranged only distance d on the conveyance direction lower stream of a river of the imprint belt 2' concerned. This transfer roller 3 has estranged imprint belt 2' and the photo conductor drum 1 concerned in the location in contact with imprint belt 2'.

[0096] alienation with the above-mentioned nip and transfer roller 3' — Pole d arranges [center / of nip width of face] about 0.5–2mm and transfer roller 3' like said example on the direction lower stream of a river of 2–4mm process from the center of contact width of face of the photo conductor drum 1 and the middle imprint object belt 2. The photo conductor drum 1 and the size of transfer roller 3' are the same as that of what was explained in said example. The record medium 11 with which the toner image was imprinted is passed to a fixing assembly 20, and fixing processing is carried out by pressurization, or heating/pressurization.

[0097] In this example, although the multiplex imprint of the two or more toner image is not carried out by monochromatic (black: Bk) image formation, a high-definition transfer picture can be obtained by considering as this configuration, without enlarging contact pressure of imprint belt 2' and a transfer roller 3. Moreover, since the surface of action of latent-image support, a middle imprint object, or an imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission.

[0098] Moreover, vibration of a transfer roller is controlled like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 9 is a mimetic diagram explaining the important section configuration of the fifth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium, it is the same as that of said 4th example except for the point that the transfer roller 3 has been arranged by imprint belt 2' and non-contact, and the same sign as drawing 8 corresponds to the same portion.

[0099] Vibration of a transfer roller is controlled by this example as well as said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 10 is a mimetic diagram explaining the important section configuration of the sixth example of this invention which applied this invention to the image formation equipment of the

method which imprints directly the toner image formed in the photo conductor drum to a record medium, it is the same as that of said 5th example except for the point using corotron 3' as an imprint means, and the same sign as drawing 8 corresponds to the same portion.

[0100] In this example, toner development of the electrostatic latent image formed in the photo conductor drum 1 is carried out with a developer 14, and corotron 3' is used as an imprint means for imprinting this on the record medium 11 which lays in imprint belt 2' and is conveyed.

Corotron 3' is installed in a distance d ($= 2-4\text{mm}$) lower stream of a river by the nip section from a center. Imprint belt 2' is non-contact, vibration of a transfer roller is controlled by this example as well as said example, and generating of Buller in the pre nip section is prevented, and, as for corotron 3', high-definition image formation is made.

[0101] Drawing 11 is a mimetic diagram explaining the whole seventh example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium. 11 The photo conductor drum of the 1st color (for example, yellow), and 12 The photo conductor drum of the 2nd color (Magenta), 13 The photo conductor drum of the 3rd color (cyan), and 14 The photo conductor drum of the 4th color (black), 2' is an imprint belt and 31-34. The transfer roller of the 1st - the 4th color and 10 Imprint belt cleaner, 11 is a record medium and 131-134. A latent image support electrification machine, and 141-144 The development counter of the 1st - the 4th color, In 15, a tray and 16 REJIROU and 19' for the pick up roll and 17 Exfoliation corotron, For a fixing assembly and 21, a discharge tray and 22 are [20] an adsorption roll and 241-244. Latent-image support cleaner, 251-254 Electric discharge corotron and 411-414 Laser and 421-424 Image formation optical system and 431-434 Scan optical system and 441-444 It is a mirror.

[0102] This example is color picture formation equipment of the so-called tandem die which arranges the imprint section which has the configuration shown in said drawing 4 to a single tier along with one imprint belt 2', and each imprint section takes charge of one color, respectively, and imprints two or more toner images in piles to the record medium of one sheet. It sets to this drawing and is the latent-image support electrification machine 131. Laser 411 charged uniformly Photo conductor drum 11 of the 1st color A latent image is written in with the laser light modulated with the picture signal of the 1st color (yellow).

[0103] The written-in latent image is a development counter 141. Negatives are developed using a yellow toner and it develops as a toner image. Photo conductor drum 11 of this 1st color Formation of a toner image is followed and it is the photo conductor drum 12 of the 2nd color. The toner image of the 2nd color (Magenta) is formed and sequential formation of the toner image of the 3rd color (cyan) and the 4th color (black) is continuously carried out to the photo conductor drum 13 of the 3rd color, and the photo conductor 1 of the 4th color, respectively.

[0104] On the other hand, a record medium 11 is picked out from a tray 15 by the pick up roll 16, and is standing by by REJIROU 17. Photo conductor drum 11 It rotates, and it is opened wide and carried in from above-mentioned REJIROU 17 so that it may be made to synchronize with the timing to which the tip of the toner image formed in the surface advances into the nip section with imprint belt 2' and a record medium 11 may advance into the above-mentioned nip.

[0105] Each transfer roller 31-34 Only distance d is arranged down-stream from the center of the nip section concerned at the rear face of imprint belt 2'. First, transfer roller 31 The record medium 11 with which the toner image of the 1st color was imprinted results in the nip of the photo conductor drum 12 of the 2nd color, and imprint belt 2' in conveyance migration of imprint belt 2'. this time — a record medium 11 — the tip of the toner image of the 1st color of imprint ***** — ** — photo conductor drum 12 of the 2nd color of the above the tip of the formed toner image is in agreement — as — the bearer rate and the photo conductor drum 12 of imprint belt 2' Peripheral speed is controlled.

[0106] Hereafter, it is the photo conductor drum 13 of the 3rd color similarly. The toner image of the 3rd formed color (Magenta), and photo conductor drum 14 of the 4th color The toner image of the 4th formed color (black) is a transfer roller 32-34. The toner image imprinted previously imprints in piles, respectively, the record medium 11 which the imprint of all toner images ended exfoliates from imprint belt 2' by exfoliation corotron 19', and is passed to a fixing assembly 20 -

— having — pressurization — or it is carried out heating/pressure treatment, and immobilization of a toner is performed.

[0107] The record medium 11 to which it was fixed is discharged by the discharge tray 21. It sets in the above-mentioned configuration and is each photo conductor drum 11-14. Transfer roller 31-34 arranged to the imprint part formed by the nip of imprint belt 2' Like what was explained by said drawing 9 Each photo conductor drum 11-14 From the nip portion with imprint belt 2', it is contacted and arranged at the rear face of imprint belt 2' in the location which estranged only distance d on the conveyance direction lower stream of a river of the imprint belt 2' concerned.

[0108] This transfer roller 31-34 In the location in contact with imprint belt 2', it is imprint belt 2' and the photo conductor drum 11-14 concerned. It is separated. Nip width of face is about 0.5-2mm like said example, and they are each above-mentioned center of the nip section, and a transfer roller 31-34. Clearance d is arranged on the direction lower stream of a river of 2-4mm process. Photo conductor drum 11-14 Transfer roller 31-34 A material and size are the same as that of what was explained in said example.

[0109] A high-definition transfer picture can be obtained also by this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 12 is a mimetic diagram explaining the whole eighth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium, and is a transfer roller 31-34. Except for the point arranged by non-contact to the rear face of imprint belt 2', it is the same configuration as said 7th example.

[0110] A high-definition transfer picture can be obtained also according to this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 13 is a mimetic diagram explaining the whole ninth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium, it is the same as that of said 8th example except for the point using corotron as an imprint means, and, in 3', the same sign as corotron and drawing 12 corresponds to the same portion.

[0111] At this example, it is the photo conductor drum 12-14. They are developers 141-144 about the formed electrostatic latent image. Toner development is carried out with each color toner, and corotron 3' is used as an imprint means for imprinting this on the record medium 11 which lays in imprint belt 2' and is conveyed. Corotron 3' is installed in a distance d (= 2-4mm) lower stream of a river by the nip section from a center. Imprint belt 2' of corotron 3' is non-contact.

[0112] A high-definition transfer picture can be obtained also according to this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, fluctuation does not arise in the imprint electric field in corotron 3' like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. In each example explained above, in the case of the transfer roller which installed the imprint means in the lower stream of a river of the nip section, and was contacted to the belt member, current flows through a belt member at the nip section from a transfer roller, and the toner image of latent-image support is imprinted by the record medium by the electric field formed in the nip section concerned.

[0113] Moreover, in a belt member, since imprint electric field are built between the imprint nip section and a transfer roller, the toner on the belt member immediately after an imprint receives exfoliation discharge, and the charge of electrification increases it. In addition, it is also the same as when a transfer roller is installed by non-contact to a belt member. If a photo conductor drum and a transfer roller are made to eat into a belt member, propagation and the drive stability of a belt member will get worse remarkably at a belt member, and vibration of a photo conductor

drum and vibration of a transfer roller will cause [so-called] banding.

[0114] Therefore, in this invention, a belt member and a transfer roller are arranged on a **** tangent to a photo conductor drum, and generating of the above-mentioned problem is prevented. Drawing 14 is explanatory drawing of the pressure of the imprint nip section, and the relation of the imprint unevenness at the time of a patch pattern (patchy pattern: mottle) imprint, a horizontal axis shows the pressure (nip pressure) (g/cm) of the nip section, and an axis of ordinate shows the grade of imprint unevenness (imprint unevenness).

[0115] Moreover, drawing 15 is explanatory drawing of the pressure of the imprint nip section, and the relation of inside omission imprint unevenness, a horizontal axis shows the pressure (nip pressure) (g/cm) of the nip section, and an axis of ordinate shows the grade of the imprint unevenness (extract during an imprint) of a patch pattern. It is shown that an image is obtained for the fitness no imprint unevenness is [fitness / nip pressure] in drawing 14 at 10 or more g/cm, and it is shown by drawing 15 that an image is obtained for the fitness in which nip pressure does not have an omission during an imprint at 20 or less g/cm. Therefore, as for nip pressure, it is desirable to consider as 20 or less g/cm by 10 or more g/cm.

[0116] If the nip pressure of a photo conductor drum and a belt member is maintained at 10 thru/or 20 g/cm, the nip width of face of a photo conductor drum and a belt member will be set to 0.5 thru/or 2mm. The tensions of the belt member at this time are 3 thru/or 4 kg-f. Even if it thinks from the field of imprint nature, it is appropriate for the nip width of face of a photo conductor drum and an imprint belt to consider as 0.5 thru/or the range of 2mm. In order to perform the stable imprint, a certain amount of nip width of face is required, there should just be 0.5mm or more, but if nip width of face is too wide, image turbulence will occur at the time of an imprint. If it is difficult this to make a photo conductor drum and a belt member into uniform velocity completely, and it has touched broadly while the belt member and the photo conductor drum had had the speed difference, in the contact area (nip width of face), image turbulence will produce it.

[0117] In the example corresponding to invention of the 10th of said this invention, it considers as the configuration which contacts a belt member to a photo conductor drum by changing the belt member into the non-contact condition beforehand to the photo conductor drum, and raising a belt member with a transfer roller. Drawing 16 is explanatory drawing of the basis of the example corresponding to the 10th invention, (a) is a block diagram and (b) is explanatory drawing of the amount of interlocking (mm) to the photo conductor drum of a belt member (imprint belt), and the relation of nip width of face (mm).

[0118] said — drawing — (— a —) — having been shown — as — a belt — a member — two — the time — a roll — two — a — 2b — building — having had — a condition — **** — a location non-contact in the photo conductor drum 1 — it is . Then, when attaching a transfer roller 3, the belt member 2 is raised in the direction of a photo conductor drum with the transfer roller 3 concerned, and the belt member concerned is contacted to the photo conductor drum 1.

[0119] Although the optimal ranges of the nip width of face of a photo conductor drum and a belt member are 0.5 thru/or 2mm as shown in this drawing (b), it is difficult to maintain the nip width of face. For example, when a photo conductor drum with a diameter of 84mm is used, in order to maintain the above-mentioned nip width of face, it is necessary to make the amount of interlocking of the belt member to a photo conductor drum or less into 0.01.

[0120] Drawing 17 is explanatory drawing of the relation of the installation gap concerned and breakdown electric field (discharge electric field: v/micrometer) for specifying a gap setup between both in the case of installing an imprint means by non-contact to a belt member. The electric field which this drawing explains the basis of a gap setup at the time of installing a belt member (a middle imprint belt, imprint belt) and an imprint means (a transfer roller, corotron) by non-contact, and are formed between a belt member and an imprint means have proper micrometer in about 10v /.

[0121] The imprint voltage impressed to the imprint means for maintaining the above-mentioned electric field is low, and ends, so that the above-mentioned gap is small. However, if the above-mentioned electric field are maintained and both gap is set to 100 micrometers or more, the voltage impressed to an imprint means will exceed 1kV, discharge will produce it from an imprint

means in a belt member, and an image will be confused.

[0122] Therefore, when the transfer roller has been arranged by non-contact to the belt member, it is necessary to set both gap to 100micro or less. When an imprint means is made into corotron, the gap tolerance of the corotron and the belt member which carry out corona discharge becomes large, and is set to 4 thru/or 10mm. However, in order to prevent the breadth of the corona discharge to the pre nip section, it is necessary to attach a baffle in the upstream discharge section of the corotron concerned.

[0123] By the way, when using a transfer roller as an imprint means, considering as a metal roll is suitable. It is good to use a metal roll with high process tolerance as a transfer roller, for maintaining a gap with the above-mentioned belt member at the precision of 100 micrometers or less, and the diameter has 20 optimalmm or less, and can use aluminum or stainless steel (SUS) as the quality of the material.

[0124] Moreover, the surface of this metal roll may be covered with a high resistance resin film. If the surface is covered with a high resistance resin film, it will be hard coming to generate a discharge phenomenon. As the above-mentioned high resistance resin, PFA, PVdF, nylon, and PC (polycarbonate) are suitable, and, for the thickness of covering of the above-mentioned high resistance resin film, 30 thru/or 100 micrometers, and a volume resistivity are 10^4 . Or 10^9 It is an $\Omega\text{-cm}$ degree.

[0125] In addition, 10^{11} thru/or $10^{13}\text{ohms} / \text{**}$ are suitable for the middle imprint hair side of belt side resistance concerned in case a belt member is a middle imprint belt. A charge maintenance property brings about image quality deterioration well by under $10^{11}\text{ohms} / \text{**}$. Moreover, if it exceeds $10^{13}\text{ohms} / \text{**}$, the current from an imprint means to the imprint nip section stops being able to flow easily, and a proper imprint becomes impossible.

[0126]

[Effect of the Invention] In the image formation equipment which imprints the non-established toner image formed on latent-image support to a record medium through a direct or middle imprint object according to this invention as explained above While vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented and high-definition image formation is made, with the image formation equipment which performs a multicolor heavy imprint The poor imprint resulting from the difference in the amount of electrifications of a toner image by which a multiplex imprint is carried out, such as an imprint omission and lack of an imprint, can be canceled, and a high-definition transfer picture can be obtained.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a mimetic diagram explaining the important section outline structure of the color printer as the first example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 2] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 3] It is a mimetic diagram explaining the important section outline structure of the color printer as the second example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 4] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the second example.

[Drawing 5] It is a mimetic diagram explaining the important section outline structure of the color printer as the third example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 6] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the third example.

[Drawing 7] It is a mimetic diagram explaining the whole color picture formation equipment configuration by this invention.

[Drawing 8] It is a mimetic diagram explaining the important section configuration of the fourth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 9] It is a mimetic diagram explaining the important section configuration of the fifth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 10] It is a mimetic diagram explaining the important section configuration of the sixth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 11] It is a mimetic diagram explaining the whole seventh example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 12] It is a mimetic diagram explaining the whole eighth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 13] It is a mimetic diagram explaining the whole ninth example configuration of this invention which applied this invention to the color picture formation equipment of the method

which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 14] It is explanatory drawing of the pressure of the imprint nip section, and the relation of the imprint unevenness at the time of a patch pattern (patchy pattern: mottle) imprint.

[Drawing 15] It is explanatory drawing of the pressure of the imprint nip section, and the relation of inside omission imprint unevenness.

[Drawing 16] It is explanatory drawing of the basis of the example corresponding to invention of the 10th of this invention.

[Drawing 17] It is explanatory drawing of the relation of the installation gap concerned and breakdown electric field (discharge electric field: $v/\text{micrometer}$) for specifying a gap setup between both in the case of installing an imprint means by non-contact to a belt member.

[Drawing 18] It is a mimetic diagram explaining the important section outline structure of the color printer as an example of image formation equipment using the belt-like middle imprint object as a belt member.

[Drawing 19] It is explanatory drawing of transition of the amount of electrifications of the toner image of the 1st color (yellow) in the primary imprint cycle on a middle imprint belt.

[Drawing 20] It is explanatory drawing of the amount of toner electrifications on a middle imprint belt, and the relation of optimal secondary imprint voltage.

[Drawing 21] It is a mimetic diagram explaining the physical relationship of the photo conductor drum in the primary imprint section indicated by the conventional technology, a middle imprint belt, and a primary transfer roller.

[Drawing 22] It is explanatory drawing of the relation between the nip pressure of a middle imprint belt and a photo conductor drum, and imprint quality.

[Description of Notations]

1 latent-image support (photo conductor drum) and 2 a belt member (a middle imprint object belt —) An imprint belt, a record-medium conveyance belt, and 2a are a drive roll, 2b, and 2c.... Follower roll, 2d A tension roll, 3 A primary transfer roller, 3' Corotron, 4 A secondary transfer roller, 5 The back up roll, 6 Contact roll, 7 A primary imprint power supply, 8 A secondary imprint power supply, 10 Middle imprint belt cleaner, 11 Record media, such as a transfer paper, 13 An electrification machine, 14 (color) Developer, 17 [.... A fixing assembly, 21 / A discharge tray, 24 / A photo conductor drum cleaner, 25 / Electric discharge machine] REJIROU, 18 A record-medium conveyance belt, 19 An exfoliation pawl, 20

[Translation done.]

* NOTICES *

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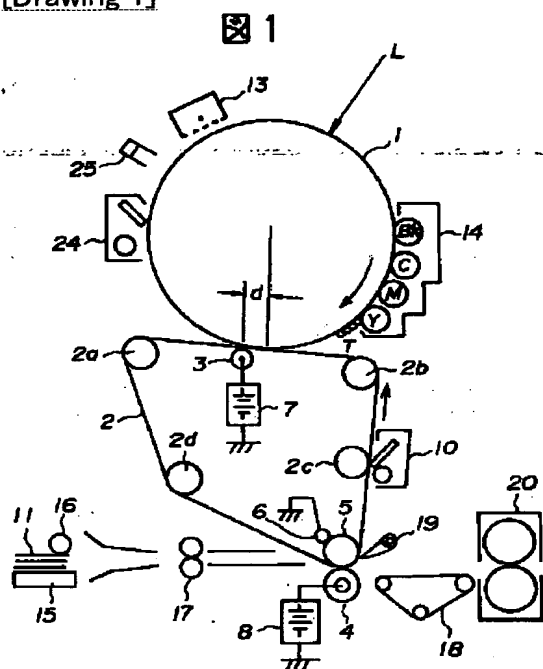
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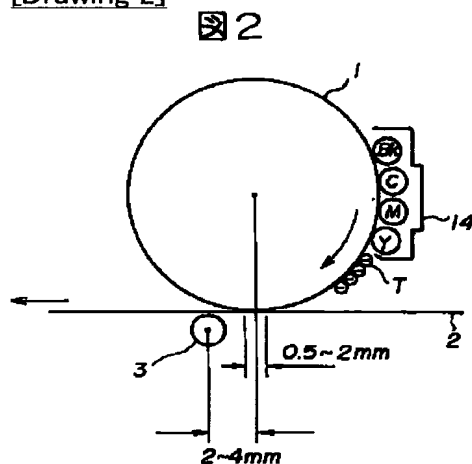
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DRAWINGS

[Drawing 1]

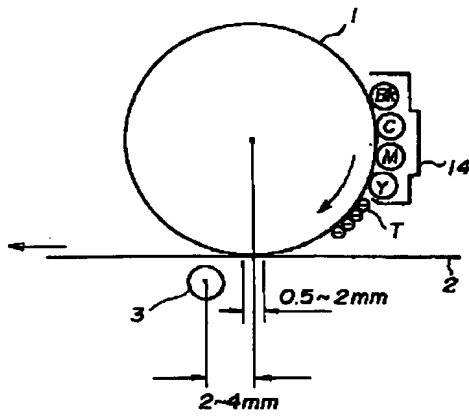


[Drawing 2]



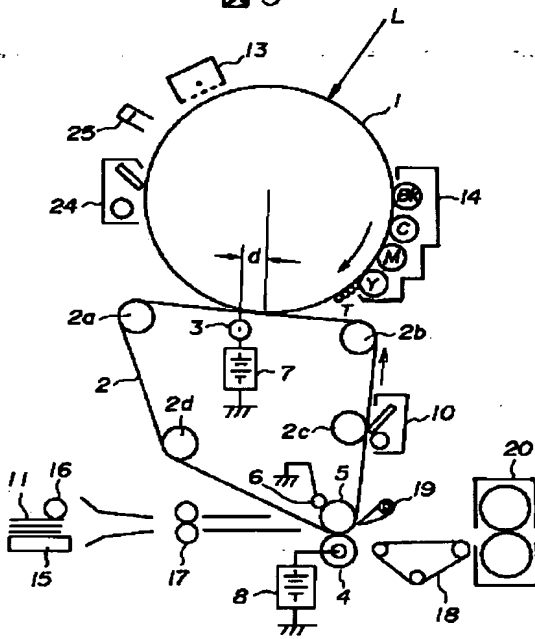
[Drawing 4]

図 4

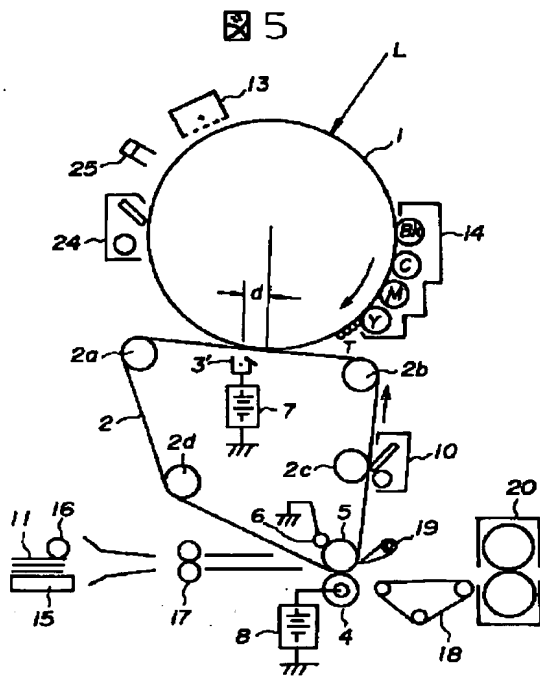


[Drawing 3]

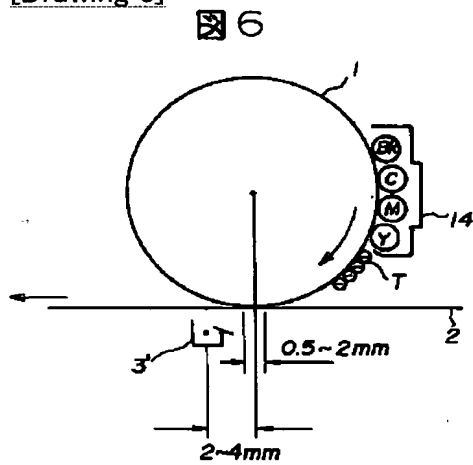
図 3



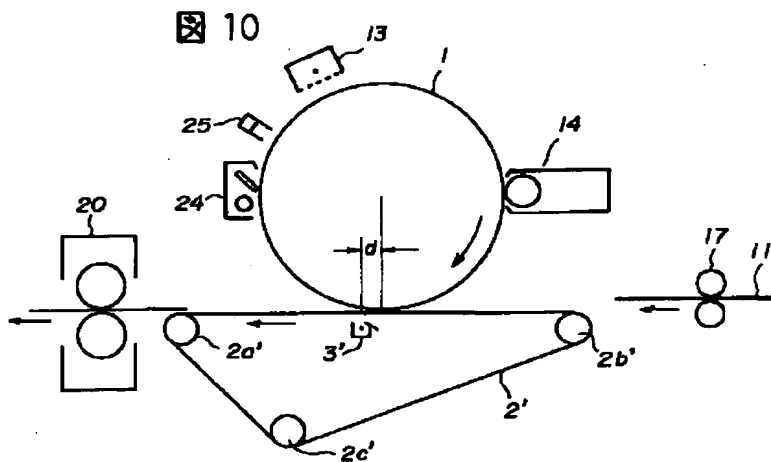
[Drawing 5]



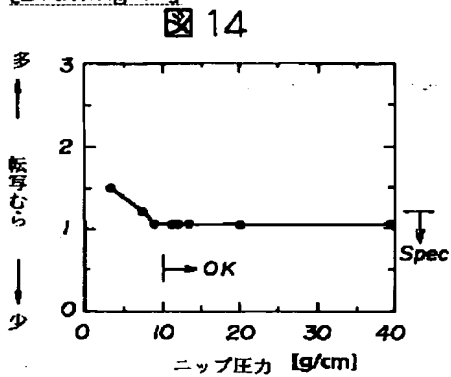
[Drawing 6]



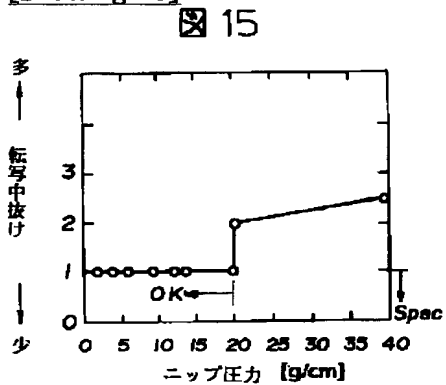
[Drawing 7]



[Drawing 14]

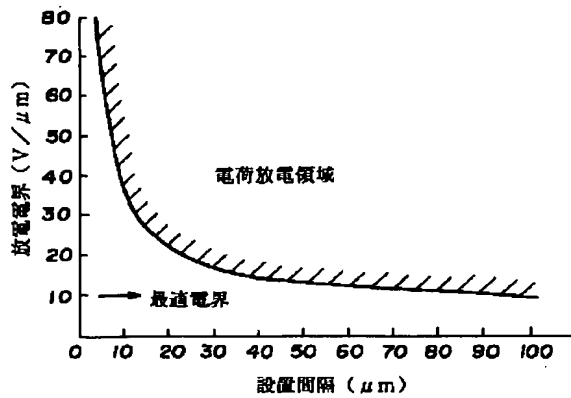


[Drawing 15]



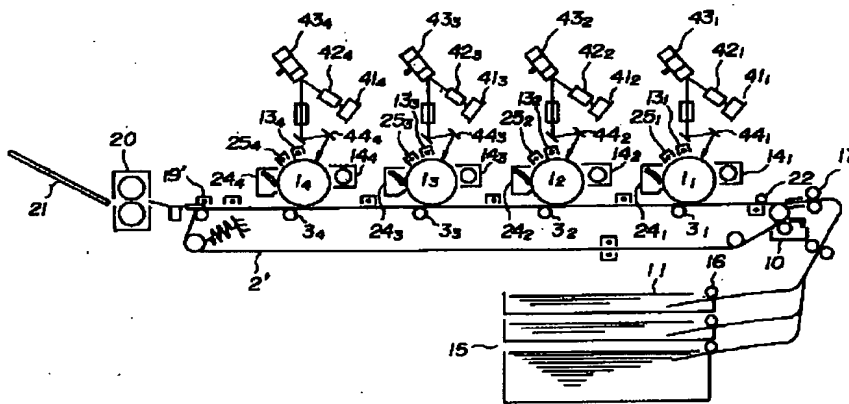
[Drawing 17]

図 17



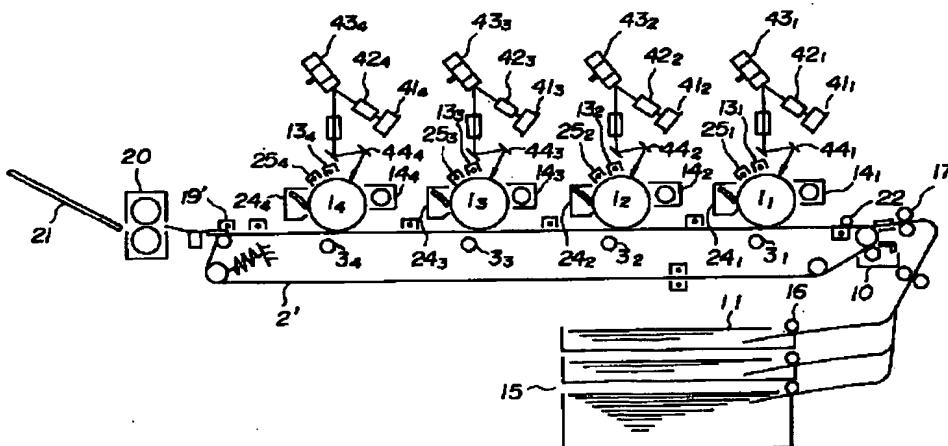
[Drawing 11]

図 11



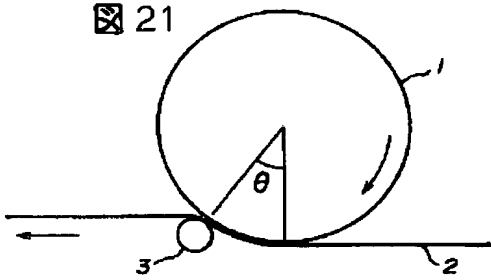
[Drawing 12]

図 12



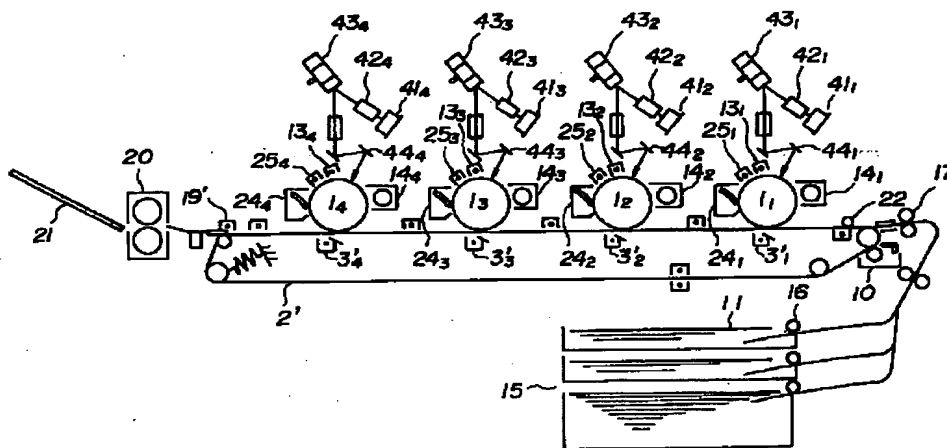
[Drawing 21]

図 21



[Drawing 13]

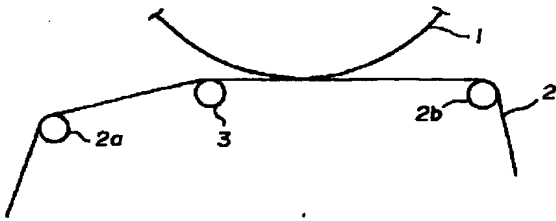
図 13



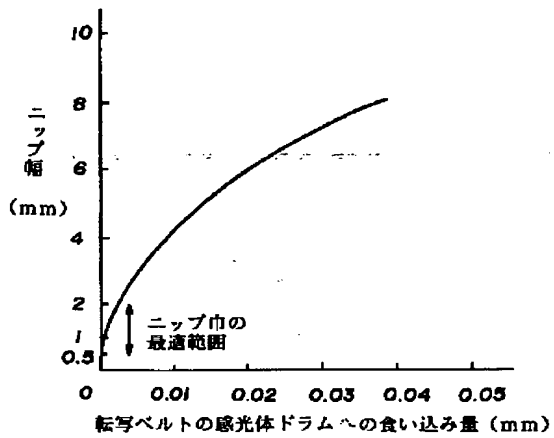
[Drawing 16]

図 16

(a)

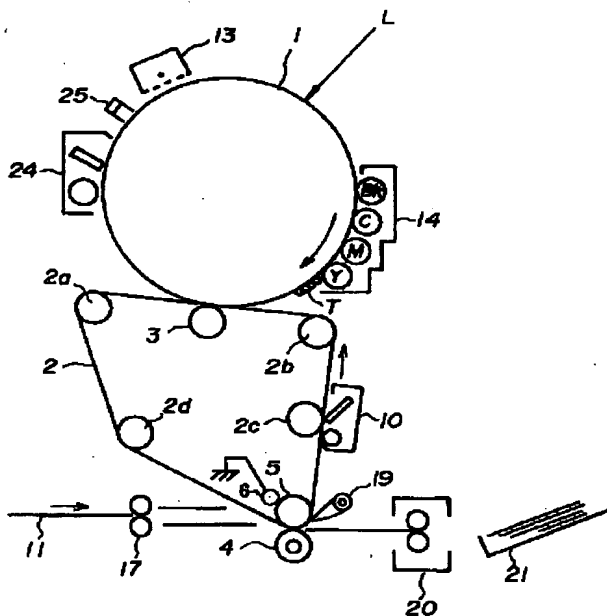


(b)



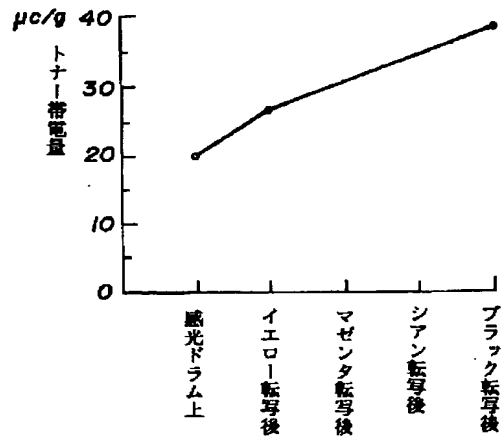
[Drawing 18]

図 18



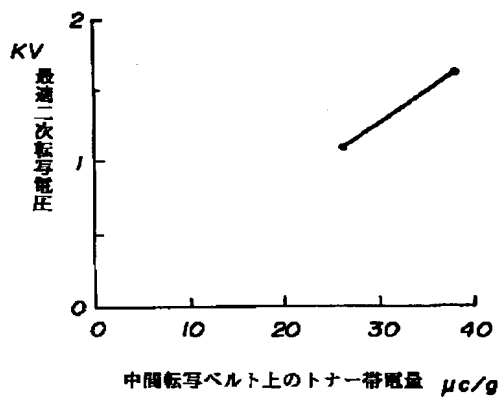
[Drawing 19]

図 19



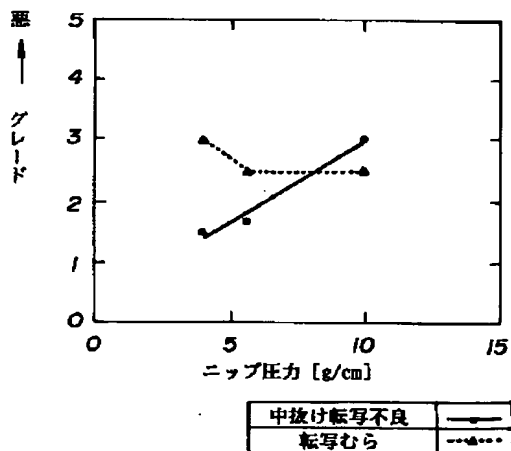
[Drawing 20]

図 20



[Drawing 22]

図 22



[Translation done.]

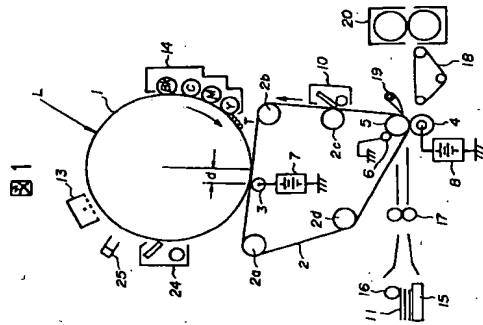
[illegible](54) 【発明の名称】
画像形成装置

【要約】(25)

【課題】 ニップ部での転写不良を解消して、高画質の転写画像を得ることのできる画像形成装置を提供する。

【解決手段】 画像倍増および増倍を形成する潜像担持体 1 と、前記潜像担持体 1 に一面を被覆して固定することく 1 1 4 と、潜像担持体 1 に形成されたトナー像を転写し配置されて潜像担持体 1 の中間転写体 2 に転写されて担持する中間転写体 2 と、中間転写体 2 に担持されたトナー像を記録媒体 11 に一括転写する転写ロール 4 と、潜像担持体 1 と前記中間転写体 2 との接触領域（ニップ部）に近接した下流に置し、かつ中間転写体 2 のトナー像担持面の裏面に設置されてトナー像の電荷極性を中和する逆性の電圧を印加することにより潜像担持体 1 ととの間に転写電界を形成してトナー像を中間転写体 2 に転写する転写装置を得ることとする。

【実施手段】 画像信号に及ぼした潜像を形成する潜像担持体１と、前記潜像を所定のトナーで現像する現像装置担持体２と、潜像担持体１に一面を接触して固着することく14、潜像担持体１に形成されたトナー層２を転写されたトナー層を形成した潜像担持体２と、中間転写体２に担持されたトナー層を形成した潜像担持体１に一面に転写する転写ロール４と、潜像担持体１と前記中間転写体２との接触領域（ニップ部）に近接した下流に配置し、かつ中間転写体２のトナー層を担持体表面の裏面に転写されてトナー像の帯電極性を逆にする逆転写装置を備え、トナー像を形成した潜像担持体１ととの間の帯電の電圧を印加することにより潜像担持体１に転写する転写ロール３とを有することなくとも備えた。



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特開平9-152791

【附】文館の用紙

【請求項1】 画像信号に応じた潜像を形成する潜像担持体と、前記潜像を所定のトナーで現像する現像装置と、前記潜像担持体に一部を接触して配置されるベルトと、前記ベルトの上部に前記潜像担持体とは反対側に配置され、前記潜像担持体に接触されたトナー像を前記ベルトの上部に接触して配置される転写手段とを少なくとも具備した画像形成装置であって、

前記転写手段を、前記増像担持体と前記ペルト部材との接触領域に近接した下流に配置したことを特徴とする画像形成装置。

【請求項2】 請求項1において、前記転写手段を前記ペルト部材と接触する位置に設置したことを特徴とする画像形成装置。

【請求項3】 請求項2において、前記転写手段が転写ロールであることを特徴とする画像形成装置。

【請求項4】 請求項3において、前記ベルト部材が前記階層像保持体と前記転写手段との共有接縁上に配置され、前記転写手段と前記階層像保持体とを離隔とする画像形成装置。

【請求項5】 請求項1において、前記転写手段を前記ペルット部材と非接触で対向する位置に設置したことを特徴とする画像形成装置。

【請求項6】 請求項5において、前記転写手段が転写

【請求項7】 請求項5において、前記転写手段がコロ

【請求項8】 請求項1において、前記画像保持体とベ
ルト部材との接圧力を10乃至20g/cmとしたこ
とを特徴とする画像形成装置。

【請求項9】 請求項1において、前記撮像担持体と前記配べルト部材との接触点中央と前記配べルト部材対向近接点中央との厚手手段との接触点中央または非接触点对向近接点中央との距離を2乃至4mmとしたことを特徴とする画像形成装置。

【請求項10】 請求項2において、前記ベルト部材は、前記静電電導性部材と対向する面が当該静電電導性部材と非接触の状態で吸着手段により吸着され、かつ、前記吸着手段と前記ベルト部材に押接することによって、前記ベルト部材と前記静電電導性部材とに接触させてなることを特徴とする前記搬送装置。

【請求項11】 請求項5において、前記ペルト部材と前記転写手段との間隔を $100\mu\text{m}$ 以内としたことを特徴とする画像形成装置。

【請求項12】 請求項7において、前記コロントンの前記ベルト部材と対向する当該ベルト部材の接離面流側に、前記静電増倍担持体と前記ベルト部材の接離面領域への電界投入を遮断するパツル坂を設置したことを特徴とする画像形成装置。

【請求項13】 請求項11において、前記転写手段を金属ロールで構成したことを特徴とする画像形成装置。

【請求項14】 請求項13において、前記金属ローラーの表面に高抵抗樹脂層を有することを特徴とする画像形成装置。

【請求項15】 請求項3において、前記転写手段の体積抵抗値が 10^4 乃至 $10^9 \Omega \cdot \text{cm}$ としたことを特徴とする画像形成装置。

[illegible]

【請求項17】 画像信号に応じた特徴を形成する感光体ドラムと、前記特徴を規定のカラーマトンで現像してカラー画像を形成し、前記カラー画像の一部を接合してカラーシートに転写する中間転写ベルトと、各色毎に順次形成された各色のトナー像を順次転写しフルカラー画像を形成する二次転写ドラムと、前記中間転写ベルト上に保持したフルカラートナー像を記録媒体上に一括転写する二次転写ドラムと、前記感光体ドラムと前記中間転写ベルトとの接触領域に近接した層に配置し、前記中間転写ベルト上のトナー像組面側の裏面に設けられ、前記中間転写ベルト上のトナー像組面側の裏面に電圧印加可能な導電性逆の極性の電圧印加部を有することにより前記感光体ドラムの間に転写電圧を形成して前記トナー像を前記中間転写ベルト上一次転写する前記中間転写ドラムと非接触に配置された一次転写ドラムとを少なくとも備えたことを特徴とするカラー画像形成装置

【請求項18】 画像信号に応じて増倍を形成する感光体ドラムと、前記増倍を所定のカラーターナーで現像するカラー現像装置と、前記感光体ドラムに一部を接触させて回転するカラーターナー像を転写する転写体と、前記感光体ドラムと前記転写体とに近接して配置し、前記転写体と逆の極性の電圧を印加することにより前記感光体ドラムとの間に電界を形成する前記転写体と接触配置する画像形成装置。

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する画像形成装置。

【請求項 19】 画像信号に応じた潜像を形成する感光

体ドラムと、前記増幅を所定のカラーナートナートで現像してカラカラ現象装置と、前記感光体ドラムに一部を接触して一周することく配置して前記感光体ドラムに形成された前記所定のカラーナートを転写する配電媒体を搬送する転写ベルトと、前記感光体ドラムと前記転写ベルトとの接点領域に近接した下流に配置し、かつ前記転写ベルトの配電媒体載置面の裏面に前記ナター像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムととの間に転写電界を形成する前記転写ベルトと非接触に配置とする画像形成装置。

【請求項20】 複色色の画像信号の各一本にばじびて母感光体をそれぞれ形成する複数の感光体ドラムと、前記複数の感光体ドラムのそれぞれに設けられて各々像を所定のカラーカラーで現像する複数のカラー現像装置と、前記複数の感光体ドラムのそれぞれの一部を接続して周回することく配置されて前記感光体ドラムのそれぞれに形成された各カラーナートナー像を独立重て転写することく搬送する転写ベルトと、前記感光体ドラムとかつ前記転写ベルトとの各接触領域に近接した下流に配置し、かつ前記転写ベルトの電圧の極性を逆にするように前記ナートの配線媒体載置面の裏面に前記ナートを形成する前記転写ベルトとを特徴とするカラー画像形成装置。

【請求項2】 複素色の画像信号の各一つにばびた海
像をそれぞれ形成する複素色感光体ドラムと、前記複色
の感光体ドラムのそれぞれに設けられて各複色を所定の
カラー状態で現像する複素の一現象装置と、前記
複素感光体ドラムのそれぞれに一節を接触して周回すること
く配置されて前記複色感光体ドラムのそれぞれに形成された
各カラーナートと、前記複色感光体ドラムと前記複写ペル
転写ペルトと、前記複色感光体ドラムと前記複写ペルトと
の各接触領域に近接した下流に配置し、かつ前記複写ペ
ルトの配向媒体設置面の裏面に前記トナー像の帯電極性
と逆の極性の電圧を印加することにより前記各感光体ドラ
ムとの間にそれぞれに静電界を形成する前記複写ペルト
と非接触に配置される複色の転写ローラーとを少なくとも
も備えたことを特徴とする複色転写一画面形成装置。

【發明の詳細な説明】

[0001]

【発明の属する技術分野】本発明は、電子写真方式の複写機やプリンタ等の画像形成装置に係り、特に増倍担持体上に形成した未定着トナー像をベルト部材で搬送され、記録媒体に直接あるいはベルト状の中間転写体を介して記録媒体に転写する画像形成装置に関する。

【0002】
【従来の技術】電子写真方式の複写機やプリンター等の画像形成装置における転写方法として、感光体ドラム等の静電相担体上に形成されたトナー像をベルト状の搬送の

媒体で搬送される記録媒体に直接転写する方式と、潜像担持体上に形成されたトナー像を一旦ドラム状あるいは無端フィルム状のベルト部材からなる中間転写体上に一次転写した後、前記中間転写体上のトナー像を改めて記録媒体上へ二次転写して複写画像を得る方式とが知られていえる。

【0003】なお、以下の説明においては、上記ペル
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リーナー、11は転写紙等の記録媒体、13感光体ドラムを所定の速度で電荷と一緒に帯電する帯電器、14は複写色（ここでは、ブラック、サイアン、マゼンタ、イエロー）の各現像器を備えたカラーイメージ装置、17は記録媒体の収納トレイから取り出された記録媒体11を二次転写ドラム4と中間転写ベルト2の接触位置（二次転写部）に所定のタイミングで供給するためのレゾナー、24は感光体ドラム1の表面電荷を除去する除電器である。

【0004】同図において、感光体ドラム1の表面は、帯電器13により一定の電位の電荷で一様に帯電され、第1色の画像信号より抽出されたレーザー光1の書き込みで、第1色の画像12（例えば、イエロー）の画像に応じた静止電荷像が形成される。この静止電荷像は、感光体ドラム1のトナー現像装置4の設置位置に到り、第1色の現像剤でトナー現像され、感光体ドラム1の表面にトナー像を相対してさらし戻される。

【0005】上記トナー現像動作に合せて、中間転写ドラム1は感光体ドラム1の周速と略同速で移動し、感光体ドラム1と中間転写ドラム2とが当接する位置（ニップ）の直下で中間転写ベルト2に接して配置された一次転写ロール3で搬送される一次転写部において、当該一次転写ロール3に印加される上記トナーの帯電極性と逆極性の像荷電により感光体ドラム1に担持されていたトナー像が中間転写ベルト2に一次転写される（一次転写サイクル）。

【0006】中間転写ベルト2に一次転写されたトナー像は中間転写ベルト2の周回移動で二次転写ロール4が配置されている二次転写部3に到る。フルカラー複写機の

50 場合は、上記した潜像の形成からトナリ像の一次転写ま

でを所要の色（一般には、イエロー：Y、サイアン：C、マゼンタ：M、黒：BK）分だけ繰り返して中間転写ベルト2上に多色トナーを重ね合わせたカラートナー像を形成する。

【0007】すなわち、カラー画像形成装置では、現象装置14には一般にB&M現像器、サイアン現像器、マゼンタ現像器、イエロー現像器の4色現像器から構成され、感光体ドラム11に形成された各色の潜像を順次現像でき、さらに各色トナーの現像器が感光体ドラム1の周りに配置される。

【0008】 感光体ドラム1に担持された第1色のトナー像は、一次転写部3の位置で中間担持体トナー24で複製され、感光体ドラム1に中間担持体トナー24で複製されたトナー像の除去がなされると共に除電部5で電荷が中和された後、次の第2色（例えば、マゼンタ）の静電像も同様に複製され、その第2色のトナー像が中間担持体トナー24の先に転写された第2色のトナー像に重ねて転写される。

[illegible]

【0010】そして、全ての必要な色のトナー像が一次転写された中間転写ベルト2が二次転写ロール4の位置に到達する時点で、トナーから取り出されてレジロール17でタイミングを取って送り出される配電線111が中間転写ベルト2と二次転写ロール4の間を給送する際、配電線111を二次転写ロール4と中間転写ベルト2およびバックアップロール5により扶持して搬送する際、二次転写ロール4と中間転写ベルト2の間に印加される上記トナー像の帯電極性と逆極性の帯電電圧で形成される上記中間転写ベルト2上のトナー像が二次転写ベルト111により中間転写される。

【0011】二次転写ロール4は導電性材料からなり、図示しない転写電源から所定の転写電圧が印加される。例えば、二次転写ロール4に転写電源を接続し、バックアップロール6に接続して回転するように配置されたコンタクトロール6を接地に接続して転写電流路を形成する。なお、コンタクトロール6に転写電源を接続し、二次転写ロール4側を接地する構成としてもよい。

【0012】ナナ一像が二次転写された記録媒体11は、剥離爪19で中間転写ベルト2から剥離され、定着器20に送られる。定着器20は一封の定着ロールの間に記録媒体11通過させる時に、記録媒体11を加熱/加圧

処理してトナー像を固定し、排出トレイ2-1に排出し、作像プロセスを終了する。二次転写が終了した中間転写ドラム2-2は中間転写体クリナー1-10を通過する時に残留トナーの除去がなされ、次の画像形成動作に備える。

【0013】このような中間転写ベルト2を用いたカラー画像形成装置では、既に多重転写のなされた合成トナー転写している像の重畳像を記録媒体11に一括で転写（各色トナー像の重畳像）を、増倍担持体1から直接記録媒体に各色のトナー像を逐次転写する方式におけるトナー像間の位置ずれや画質の乱れの発生を効果的に防止することができるといった利点を有している。

【0014】従来、この種の画像形成装置としては、特
開平6-95521号公報に記載のものが知られてい
る。

[0015]

【発明が解決しようとする課題】 上記の画像プロセスにおいて、中間転写ベルト上に最初に転写されたトナー像（イエロートナー像）は第2色のトナー像（マゼンタ像）、第3色のトナー像（サイアン）および第4色のトナー像（ブラック）の各トナー像を順次転写するときにも転写部を受け、上記色のトナー像の転写時にその帯電率が増大して行く。

【0016】図19は中間転写ベルト上の一次転写サイクルにおける第1色（イエロー）のトナリ像の帯電量の推移の説明図である。同図に示されたように、中間転写ベルト2に一次転写された第1色であるイエローのトナリ像は、その後第2色（マゼンタ）、第3色（サイアン）、第4色（ブラック）の一次転写の実行ごとにその帯電量が上昇して行く。

【0017】また、第2色（マゼンタ）のトナー像が中電圧転写ユニット上の第1色のイエロー像に重ねられ、また、一中電圧転写ユニット上の第3色のシアン像が無し部分に一次転写された後、第3色（サイアン）、第4色（ブラック）の一次転写の実行時にその帯電量が上昇して行くと同時に、第4色（ブラック）のトナー像が一次転写を受けた後、第3色（ブラック）のトナー像が一次転写を受けてその帯電量が上昇する。

【0018】しかし、最終色の第4色（ブラック）のトナー像は、他のトナーの転写がないので、一次転写時の帯電電圧を維持する。このように、中間転写ベルト2上に一次転写された4色のカラートナー像は、図示したような帯電電圧の異なるトナー像が形成される。トナー像の順でトナー帯電電圧が高くなっている。

【0019】二次転写では、上記した帯電量の異なる複数のトナー像を記録媒体に一括して転写することになるが、この二次転写における中間転写ベルト2上のトナーに対する最速転写電圧 V_{WT} とトナーの帯電量によって異なるのである。図2は中間転写ベルト上のトナー帯電量と最速二次転写電圧 V_{WT} の相関の説明図であって、横軸に中間転写ベルト上のトナー帯電量($\mu m/g$)を、縦軸に

【0043】中間転写ペルトラは、現像されたトナー像を保持した感光体ドラムに一部を接触して周回するごとく配置され、前記感光体ドラムに各色毎に順次形成された各色のトナー像を順次転写しフルカラートナー像として保持する。二次転写ロールは、前記中間転写ペルトラに担持されたフルカラートナー像を記録媒体に一括転写する。

【0044】一次転写ローレルは、潜像保持体と前記中間転写ペレットとの接触領域に近接した下流に配置され、かつ前記中間転写ペレットと逆の極性の電圧を印加することによって前記中間転写ペレット上に転写電荷を形成してトナー像を形成し、トナー像の帯電極性と逆の極性の電圧を印加することによって前記中間転写ペレットと中間転写ペレットとの接触移動に伴う一次転写ローレルの振動が抑制され、ニップ圧の変動が無くなって一次転写ムラが発生することがない共に、ブラー発生の原因である転写手段からの電界がニップ部においてブレイクを発生させることがなくなり、高画質の画像形成が可能となる。

【0045】さらに、請求項1に記載の第17の発明は、画像信号に応じた潜像を形成する感光体ドラムと、前記潜像を所定のカラートナーで現像するカラー現像装置と、潜像感光体ドラム一面を接触して周回することと配置されて前記潜像感光体ドラムに各色毎に順次形成された各色のトナー像を順次転写するカラーカラートナー像として保持する中間転写ベルトと、前記中間転写ベルトに担持された中間転写トナー像を感光体ドラム一面に転写する二枚転写ロールと、前記感光体ドラムと前記中間転写ベルトとの接触領域に近接した液面に配置し、かつ前記中間転写ベルトのトナー像担持面と液面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成して前記トナー像を前記中間転写ベルトに一次転写する前記中間転写ベルトと、前記中間転写ベルトに一次転写するトナー像を少なくとも備え、該トナー像を排液した。

【0046】この構成において、感光体ドラムは所定の極性で、例えば、帯電された後、所定色の画像信号に基じた潜像を形成する。カラー現像装置は所定の複色のトナーを有する複色のトナー現像器を有し、前記潜像を所定のトナーで現像する。

【0047】中間転写ベルトは、現像されたトナー像を保持した感光体ドラムに一部を接触して周回することく配置され、前記感光体ドラムに各色毎に順次形成された各色のトナー像を順次転写しフルカラートナー像として転写する。二次転写ロールは、前記中間転写ベルトに担持されたフルカラートナー像を記録媒体に一括転写する。

【0048】一次転写ロールは、潜像担持体と前記中間転写ベルトとの接触領域に近接した下流に配置され、か

の帯電極性と逆の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写ベルトと非接触に配置された転写ロールとを少なくとも備えたことを特徴とする。

【0053】この構成において、感光体ドラムは所定の極性で一律に帯電された後、所定色の画像信号に応じたレーザー光等の走査で当該所定色の画像信号に応じた潜像を形成する。カラー現像装置は所定の複色色のトナーを有する複数のトナー現像器を有し、前記潜像を所定のトナーで現像する。

【0054】 駆写ペルットラムにははばの一部を接続し、周囲の所定とく配置され、前記駆写ペルットラムに形成された前記駆写のトナール像を駆写する記録媒体を搬送した。駆写ローラーは、感光体ドラムと前記駆写ペルットとの接触領域に近接した下流に配置し、かつ駆写ペルットの感光媒体搬送面の裏面に非磁性体層を設けられ、前記トナール像の帯電極性と逆の極性の電圧を印加することにより、前記感光体ドラムとの間に駆写電界を形成する。

【0055】これにより、感光体ドラムと転写ベルトとの押接移動に伴う転写ロールの振動が抑制され、ニップ圧の変動が無くなって転写ムラが発生することがないと共に、ブラー発生の原因である転写手段からの電界がブレニップ部においてブラーを発生させることがなくなる。

り、高画質の画像形成が可能となる。さらに、請求項20に記載の第20の発明は、複素数の画像信号の各一つに比じた増倍をそれぞれ形成する複数の感光体ドラムと、前記複数の感光体ドラムのそれぞれに配けられて各一増倍率を所定のカラーナードで調整する複数のカラー増倍装置と、前記感光体ドラムのそれぞれに一部を接触して周回することく配置されて前記感光体ドラムのそれぞれに形成された各カラーナード位置を異なる重量で転写すると共に搬送される転写ベルトと、前記感光体ドラムと前記転写ベルトとの各接触領域に近接した下流に配置し、かつ前記転写ベルトの配電媒体載置面の裏面に前記ナード像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムと該配電媒体との間にそれぞれ異なる電界を形成することを特徴とし、少なくとも間違ったことを特徴とする。

【0056】この構成において、複数の感光体ドラムは、複数の色の画像信号の各1つに対応した潜像を形成する。複数のカラー現像装置は、前記複数の感光体ドラムのそれぞれに設けられて各潜像を所定のカラートナーで現像する。転写ベルトは、感光体ドラムのそれぞれに一部を接触して周回するごとく配置され、前記感光体ドラムのそれぞれに形成された各カラートナー像を順次重ねて転写するごとく搬送される。

ることにより、前記各感光度ドラムとの間にそれぞれ駆転転写電界を形成する。これにより、各感光度ドラムと駆転写電極との押接移動に伴う転写ムラが発生することなく、ニップ圧の変動が無く転写ムラが発生することはないと共に、プララ発生の原因である転写手段からの電界がそれぞれのプライミング部においてプレーラを発生させることなくなり、高画質の画像形成が可能となる。

【0058】さらに、請求項2に記載の第21の発明は、複色色の画像信号の各一つに応じた画像をそれぞれ形成する複数の感光体ガラスと、前記複数の感光体ガラスのそれぞれに設けられ、各々画像を所定のカラーパターンで現像する複数のカラー現像装置と、前記感光体ガラスのそれぞれに一部を接触して周回することく配置された前記感光体ガラスのそれぞれと形成された各カラーパターン像を順次重ねて転写することく搬送する転写ペルトと、前記各感光体ガラスと前記転写ペルトとの各接触領域に近接した下流に配置し、かつ前記転写ペルトの配設媒体載置面の裏面に前記カラーパターン像の帯電極性と逆の極性の電圧を印加することにより前記各感光体ガラスとの間にそれぞれ転写電界を形成する前記転写ペルトと非接触に配置された複数の転写ローラとを少なくとも備えたことを特徴とする。

【0059】この構成において、複数の感光体ドラムに複数の色の画像信号の各1つに応じた潜像を形成する。複数のカラー現像装置は、前記複数の感光体ドラムのそれぞれに設けられて各潜像を所定のカラートナーで現像する。転写ベルトは、感光体ドラムのそれぞれに一部を接続して周回すること、配置されて前記感光体ドラムのそれぞれに形成された各カラートナー像を順次重ねて転写することと搬送される。

【0060】複数の転写ローロールは、前記各感光体ドラムと前記転写ペルレットとの各接触領域に近接した下流に配置され、かつ前記転写ペルレットの配設される位置の裏面に非接触で、前記ドラム像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間にそれぞれ転写電界を形成する。これにより、各感光体ドラムと転写ペルレットとの押接移動に伴う各転写ローロールの振動が抑制され、ニップ圧の変動が無くなって転写ムラが発生することがないと共に、ブロー発生の原因である転写手段からの電界がそれぞれのアプレニップ部においてブラを発生させることがなくなり、高画質の画像形成が可能となる。

【0061】なお、上記第1乃至第21の発明における画像記録媒体である感光体ドラムは、一般的にはレーザ光を用いた光の走査と静電潜像を形成する感光体性材料を被覆したドラム本体部材であるが、潜像記録媒体として上記に限らず、磁気ヘッドやイオンヘッドで潜像を形成する形式のものでもよい。また、上記発明の何れかにおけるベルト部材も、一般的には複巻のロール間に掛け運

25 μA で良好な転写性が得られた。
【0080】一次転写ロール3の体積抵抗率は $1.04 \sim 1.09 \Omega \cdot \text{cm}$ が好適であり、その材料はスポンジ状の発泡弾性シリコンゴムで、硬度は $2.5 \sim 4.5$ (アスカC測定)のものを用いた。なお、一次転写ロール3の材料は、この他にEPDM、ポリウレタン等の材料も、上記の各値を満足するものであれば使用できる。

【0081】本実施例では、一次転写ロール3の径は20mm、感光体ドラム1の径は84mmである。上記構成で、一次転写を行うと、二次転写において二次転写ロール3に印加する一次転写電圧をプラス1、6KVにし、良好な画質が得られる。これは、中間転写ベルト2上のトナー像が第1色であるイエローから最終色であるブルーックまで、その帯電量が安定しているからである。

【0082】上記帯電量の安定化は、一次転写部における感光体ドラムから中間転写ベルトが剥離する部分での転写電界傾度が一次転写ロールから感光体ドラムと中間転写ベルトとの接触部までであり、上記剥離部において剥離電界が強まり、その剥離放電により中間転写ベルト上のトナー像の帯電量が増加することによる。また、一次転写ロール3と中間転写ベルト2との距離が100 μm 以内であれば、両者を非接触とした場合でも良好な転写性が得られる。

【0083】図3はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第二実施例としてのカラープリンターの要部回路構造を説明する模式図。図4は第二実施例の一次転写部分の詳細構成を説明する要部回路図であって、図1と同一符号は同一部分に対応する。

この実施例は、一次転写ロール3を中間転写ベルト2の表面に非接触で配置した構成を除いて、前記図1と同様の構成である。

【0084】この実施例においては、一次転写ロール3は、ニップ部中央から2乃至4mm下流に非接触で配置され、中間転写体ベルト2との距離が100 μm 以内となるように非接触の位置に設置される。このときの一次転写ロール3は定電流制御で、電流値を15～25 μA とすればよい。

【0085】本実施例でも上記第1実施例と同様に、高画質の画像形成が可能となる。図5はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第三実施例としてのカラープリンターの要部回路構造を説明する模式図。図6は第三実施例の一次転写部分の詳細構成を説明する要部回路図であって、図3と同一符号は同一部分に対応する。

【0086】この実施例は、一次転写手段としてコロン3'を中間転写ベルト2の裏面に非接触で配置した構成を除いて、前記図3と同様の構成である。この実施例においては、コロン3'は、ニップ部中央から2乃至4mm下流に非接触で配置される。本実施例でも上記第1実施例と同様に、高画質の画像形成が可能とな

【0074】二次転写が終了した中間転写ベルト2は中間転写体クリナー10を通過する時に残留トナーを除き去られ、次の画像形成動作に備える。図2はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の一次転写部分の詳細構成を説明する要部回路図であって、図1と同一符号は同一部分に対応する。

【0075】図2において、感光体ドラム1の表面には現像装置14によりマイナスイオン極性に帯電されたトナー像1が形成されている。中間転写体ベルト2はポリイミド系樹脂で構成され、その厚みは60～90 μm 、体積抵抗率は $1.09 \sim 1.0^{12} \Omega \cdot \text{cm}$ 、表面抵抗率は $1.0^{11} \sim 1.0^{13} \Omega/\square$ に調整された半導電性の樹脂フィルムである。

【0076】この中間転写体ベルト2は、厚み、体積抵抗率、表面抵抗率が上記の値の範囲に入っている半導電性樹脂材料なら使用可能である。この他にアクリル系樹脂、塩化ビニル系樹脂、ポリエステル系樹脂、あるいはポーカーボネート系樹脂等に抵抗安定化材料を含有させたものも使用できる。さて、言い換えれば、一次転写部における中間転写体ベルト2は感光体ドラム1の表面の接線の上に配置する。つまり、中間転写体ベルト2の裏面の感光体ドラム1への接触力はほとんど0になる。少しでも中間転写体ベルト2を感光体ドラム1にラップさせると、接触圧は非常に高くなってしまふ。

【0077】一次転写部における感光体ドラム1と中間転写体ベルト2との接触圧は、一次転写ロール3を図示しないバッキングによって図の上方に押し上げることにによって得られる。この圧力は10～20 g/cm が好適であり、これより接触圧が高くなり転写不良が発生する。また接触圧が低いと転写むらが生じる。

【0078】したがって、中間転写体ベルト2と感光体ドラム1との接触幅(ニップ幅)は0.5～2mm程度となる。一次転写ロール3は感光体ドラム1と中間転写体ベルト2との接触幅中央より2～4mmプロセス方向下流に配置する。転写作用は転写電流が一次転写ロール3から半導電性の中間転写体ベルト2に伝わって、感光体ドラム1と中間転写体ベルト2との接触傾斜に流れ込むことにより行われる。

【0079】感光体ドラム1の上流のマイナス帯電トナー像を転写するため、一次転写ロール3にはプラス電圧を印加するが、一次転写ロール3の底流のばらつき、中間転写体ベルト2の抵抗のばらつき、トナーの帯電のばらつき等があるので、転写電界の制御は定電流制御を採用した方が望ましい。本実施例では、転写電流が15～

【0068】一次転写ロール3は感光体ドラム1と中間転写体ベルト2の接触部(ニップ部)中央から数個中間転写体ベルト2の下流側にd(2乃至4mm)だけ離間し、かつ当該中間転写体ベルト2のみに接する部分に設置される。上記ニップ部の圧力すなわちニップ圧は10乃至20 g/cm に設定される。中間転写ベルト2に一次転写されたトナー像は中間転写ベルト2の間隔移動で二次転写ロール4が配置されている二次転写部に到る。

【0069】フルカラー複写機の場合は、上記した画像の形成からトナー像の一次転写までを所要の色(一般には、イエロー：Y、サイアン：C、マゼンタ：M、黒：BK)分だけ繰り返して中間転写ベルト2上に多色トナーを重ね合わせたカラートナー像を形成する。すなわち、カラー画像形成装置では、現像装置14は一般にサイアン現像器、マゼンタ現像器、イエロー現像器、BK現像器の4色現像器から構成され、感光体ドラム1に形成された各色の画像を順次現像できるように各色トナーの現像器が現像部位に選択的に位置されるか、あるいは現像位置が感光体ドラム1の周りに順次配置される。

【0070】感光体ドラム1に相対された第1色のトナー像は一次転写器3の位置で中間転写ベルト2上に転写した。その後、感光体ドラム1は増像担持体クリナー24で残留トナーの除去がなされると共に除電器25で電荷が中和された後、次の第2色に対応する画像の形成がなされる。第2色(例えば、マゼンタ)の静電潜像も同時に現像され、その第2色のトナー像が中間転写ベルト2の先に転写された第1色のトナー像に重ねて転写される。

【0071】以下、第3色(サイアン)、第4色(ブラック)についても同様に中間転写ベルト2に多量転写され、その結果、中間転写ベルト2には未定数の複数トナーが重畳したカラートナー像が形成される(二次転写サイクル)。なお、このとき、最終トナー像の転写が終了するまで、二次転写ロール4や中間転写体クリナー10、剥離爪は中間転写ベルト2から退避された位置にある。

【0072】そして、全ての必要な色のトナー像が一次転写された中間転写ベルト2が二次転写ロール4の位置に達する時点で、トレー15から取り出されてレジロール17でタイミングを取って送り出される配電媒体11が中間転写ベルト2と二次転写ロール4の間に給送される。配電媒体11は二次転写ロール4と中間転写ベルト2およびバックアップロール5により支持して搬送する際に、二次転写ロール4と中間転写ベルト2の間に二次転写電圧8が印加される上記トナー像の帯電極性の逆極性の転写電圧によって形成される転写電界により中間転写ベルト2上のトナー像が配電媒体11に一括して二次転写される。

【0073】トナー像が二次転写された配電媒体11は

した無電圧トナ材であるが、これに限るものではなく、ドラム状に支持した構成としたものでもよい。

【0062】さらに、前記第20乃至第21の発明における転写ベルト上に搬送して搬送する転写電圧等の配電媒体上に複数の増像担持体(感光体ドラム)にそれぞれ担持させた増像色のトナー像を当該増像担持体の搬送に従って順次重ねて転写する形式のカラー画像形成装置においては、全ての感光体ドラムの転写電圧を構成する転写手段をニップ部下流に配置する構成としたが、本発明はこれに限るものではなく、その1または2あるいは3のみに、若しくは転写電圧が高い最終の増像部位のニップ部に配置する転写部材(転写ロールあるいはコロン)のみを当該ニップ部下流に配置する構成としてもよい。

【0063】本発明によれば、増像担持体に担持されたトナー像を転写する転写ロールを当該増像担持体と中間転写体ベルトとあるいは転写ベルトなどの転写体との接触部位(ニップ)の下流側に配置したことにより、上記転写体と増像担持体とが離れる領域における剥離放電が大きくなり、転写された複数のトナー像の中にも帯電量が少ない最終転写トナーの帯電量が增大され、配電媒体への二次転写あるいは配電媒体への直接転写時の転写不良が防止される。

【0064】そして、増像担持体と中間転写体あるいは転写ベルトとの接触傾斜は短いままなので、両者のニップ圧力は大きくなり、したがって、所望の転写の転写不良も生じない。

【0065】

【発明の実施の形態】以下、本発明の各種形態につき、実施例を参照して詳細に説明する。図1はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第一実施例としてのカラープリンターの要部回路構造を説明する模式図であって、前記図18と同一符号は同一部分に対応し、6はコンタクトロール、7は一次転写電圧、8は二次転写電圧、15はトレー、16はバックアップロール、17はレジロールである。

【0066】図1において、感光体ドラム1の表面は帯電器13により所定の極性の電荷で一様に帯電され、第1色の画像形成で搬送されたレーザー光の書き込み走査で上記第1色(例えば、イエロー)の画像に応じた静電潜像が形成される。この静電潜像は、感光体ドラム1の回転で現像装置14の設置位置に到り、第1色の現像器でトナー像と、感光体ドラム1は下流されたトナー像を担持してさらに回転する。

【0067】上記トナー像動作に合わせて、中間転写ベルト2は感光体ドラム1の周速と略同速で移動し、感光体ドラム1と中間転写ベルト2とが当該部分で一次転写部でトナー像に一次転写電圧7から印加される上記トナーの帯電極性とは逆極性の転写電界により感光体ドラム1に担持されていたトナー像が中間転写ベルト2に一次転写される(一次転写サイクル)。

る。

【0087】図7は本発明によるカラー画像形成装置の全体構成を説明する模式図であって、ベルト中央部中間転写体を用いた前記図1の構成を有するものである。なお、前記第三実施例、第四実施例に対応する画像形成装置全体構成は一次転写手段を除いて同様である。

図8において、40はレーザー書き込み部、50は画像信号処理部、60は作像部、70は作像制御部である。

【0088】レーザー書き込み部40はレーザー41、結像光学系42、走査光学系43、ミラー44からなり、レーザー41は画像信号処理部50で各種の補正等の信号処理を施した各色の画像信号で変調されたレーザー光1を照射する。作像部60は、感光体ドラム1、中間転写ベルト2、一次転写ロール3、二次転写ロール4を有し、感光体ドラムの周辺には潜像担持体帯電器（コロトロン）13、カラー現像装置、潜像担持体クリーナ24、除電器25が設置されている。また、中間転写ベルト2は駆動ロール2a、従動ロール2b、テンションロール2d、およびバックアップロール5に案内されて搬送移動する。

【0089】バックアップロール5にはコンタクトローラ6が接触回転するように配置されており、転写電源8→二次転写ロール4→記録媒体11と中間転写ベルト2の積層部→バックアップロール5→コンタクトローラ6→接地に到る転写電流路を構成する。感光体1はカラー一面を構成する各色のトナー像の最終トナー像が中間転写ベルト2上に一次転写された後、中間転写ベルト2は二次転写ロール4が配置されている二次転写部位に搬送されてくる。

【0090】一方、トレー15からは記録媒体11がバックアップロール16により一枚取り出され、レジスト17で待機し、上記中間転写ベルト2に担持された多色トナー像が二次転写ロール4と中間転写ベルト2のニップ部に進入するタイミングで記録媒体11は同時に上記ニップ部に進入する。二次転写部では、転写電源8から印加される二次転写電圧により、上記した転写電流路に転写電流が流れ、中間転写ベルト2に担持された多色トナー像を記録媒体11に一括して転写する。

【0091】多色トナー像が転写された記録媒体11は刺蝮爪19で中間転写ベルト2から剥離され、記録媒体搬送ベルト18により定着器20に搬入されて定着処理された後、排出トレー21に排出される。また、トナー像を記録媒体11に転写する中間転写ベルト2は中間転写体クリーナ10によって残留トナーの除去が行われ、次の転写プロセスに備える。

【0092】このように、中間転写ベルト上に多量転写した多色トナー像を記録媒体に良好に転写することができ、商品質のカラー画像を得ることができる。感光体ドラムと中間転写ベルトの接触領域は短いままなので、両者のニップ圧力は大きくならず、したがって、所謂中抜け

けの転写不良も生じない。また、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。

【0093】図8は感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第四実施例の要部構成を説明する模式図であって、1は感光体ドラム、2'は転写ベルト、3は転写ロールである。感光体ドラム1の回りには当該感光体ドラムの表面に一枚な帯電荷で帯電させるための潜像担持体帯電器（コロトロン）13、感光体ドラム1に形成された潜像を現像する現像装置14、潜像担持体クリーナ24、除電器25等が配置されている。

【0094】転写ベルト2'は前記第1実施例と同様の材料で構成され、駆動ロール2a'、従動ロール2b'、テンションロール2c'に掛け渡されて矢印方向に搬送される。また、11は記録媒体であり、図示しないトレーから取り出された記録媒体11はレジロール7で待機し、感光体ドラム1に形成されたトナー像が転写ロール3が設置された転写部（感光体ドラム1と転写ベルト2'の接触部：ニップ部）に回転して来るタイミングで同ニップ部に搬入される。

【0095】転写ロール3は、感光体ドラム1と転写ベルト2'とのニップ部分から、当該転写ベルト2'の搬送方向下流に距離だけ離間した位置で転写ベルト2'の裏面に接触して搬送されている。この転写ロール3が転写ベルト2'と接触する位置では、当該転写ベルト2'と感光体ドラム1は離間している。

【0096】上記ニップと転写ロール3'との離間距離dは前記実施例と同様にニップ幅中央より0.5～2mm程度、転写ロール3'は感光体ドラム1と中間転写ベルト2との接触幅中央より2～4mmプロセス方向下流に配置する。感光体ドラム1や転写ロール3'のサイズも前記実施例で説明したものと同様である。トナー像が転写された記録媒体11は定着器20に渡されて加圧あるいは加熱/加圧で定着処理される。

【0097】本実施例では、単色（ブラック：Bk）の画像形成で、複数トナー像を多重転写するものではないが、この構成とすることにより、転写ベルト2'と転写ロール3の接触圧を大きくすることなく高画質の転写画像を得ることができる。また、潜像担持体と中間転写体あるいは転写ベルトの接触傾斜は短いままなので、両者のニップ圧力は大きくならず、したがって、所謂中抜けの転写不良も生じない。

【0098】また、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。図9は感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第五実施例の要部構成を説明する模式図であって、転写ロール3が転写ベルト2'と非接触で配置された点を除いて前記第

4実施例と同様であり、図8と同一符号は同一部分に对应する。

【0099】本実施例によっても、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。図10は感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第六実施例の要部構成を説明する模式図であって、転写手段としてコロトロン3'を用いた点を除いて前記第三実施例と同様であり、図8と同一符号は同一部分に対応する。

【0100】本実施例では、感光体ドラム1に形成した静電潜像を現像装置14でトナー現像し、これを転写ベルト2'に搬送して搬送される記録媒体11上に転写するための転写手段としてコロトロン3'を用いたものである。コロトロン3'はニップ部に中央から距離d（＝2～4mm）下流に設置される。コロトロン3'は転写ベルト2'とは非接触であり、本実施例によっても、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。

【0101】図11は複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接転写する方式のカラー一面形成装置に本発明を適用した本発明の第七実施例の全体構成を説明する模式図であって、11は第1色（例えば、イエロー）の感光体ドラム、12は第2色（マゼンタ）の感光体ドラム、13は第3色（シア）の感光体ドラム、14は第4色（ブラック）の感光体ドラム、2'は転写ベルト、31～34は第1～第4色の転写ロール、10は転写ベルトクリーナ、11は記録媒体、131～134は潜像担持体帯電器、141～144は第1～第4色の現像器、15はトレー、16はバックアップロール、17はレジロール、19は刺蝮爪コロトロン、20は定着器、21は排出トレー、22は吸着ロール、241～244は潜像担持体クリーナ、251～254は除電コロトロン、411～414はレーザー、421～424は結像光学系、431～434は走査光学系、441～444はミラーである。

【0102】本実施例は、前記図4に示した構成を有する転写部を一つの転写ベルト2'に沿って一列に配置して、各転写部がそれぞれ一つの色を担当して、一枚の記録媒体に複数のトナー像を重ねて転写する、所謂タンデム型のカラー一面形成装置である。同図において、潜像担持体帯電器131で一枚に帯電されたレーザー411は第1色の感光体ドラム11は第1色（イエロー）の画像信号で変調されたレーザー光で潜像を書き込まれる。【0103】書き込まれた潜像は現像器141でイエロートナーを用いて現像され、トナー像として顕像化される。この第1色の感光体ドラム11へのトナー像の形成に続いて、第2色の感光体ドラム12に第2色（マゼン

タ）のトナー像が形成され、続いて第3色の感光体ドラム13、第4色の感光体14に対してそれぞれ第3色（シア）ン、第4色（ブラック）のトナー像が順次形成される。

【0104】一方、記録媒体11はトレー15からピックアップロール16により取り出され、レジロール17で待機している。感光体ドラム11が回転して、その裏面に形成したトナー像の先端が転写ベルト2'とのニップ部に進入するタイミングに同期させて記録媒体11が上記ニップ部に進入するように上記レジロール17から案内放されて搬入される。

【0105】各転写ロール31～34は転写ベルト2'の裏面に当該ニップ部中央から距離dだけ下流に配置されている。まず、転写ロール31で第1色のトナー像が転写された記録媒体11は、転写ベルト2'の搬送移動で第2色の感光体ドラム12と転写ベルト2'とのニップ部に至る。このとき、記録媒体11に転写されている第1色のトナー像の先端と上記第2色の感光体ドラム12に形成されたトナー像の先端とが一致するように転写ベルト2'の搬送速度と感光体ドラム12の周速が制御される。

【0106】以下、同様にして、第3色の感光体ドラム13に形成された第3色（マゼンタ）のトナー像、第4色の感光体ドラム14に形成された第4色（ブラック）のトナー像が転写ロール32～34によって先に転写されたトナー像にそれぞれ重ねて転写される。全てのトナー像の転写が終了した記録媒体11は刺蝮コロトロン19'により転写ベルト2'から剥離され、定着器20に渡されて加圧あるいは加熱/加圧処理されてトナーの固着が行われる。

【0107】定着された記録媒体11は排出トレー21に排出される。上記の構成において、各感光体ドラム11～14と転写ベルト2'のニップで形成される転写部に配置される転写ロール31～34は前記図9で説明したものと同様、各感光体ドラム11～14と転写ベルト2'とのニップ部分から、当該転写ベルト2'の搬送方向下流に距離dだけ離間した位置で転写ベルト2'の裏面に接触して搬送されている。

【0108】この転写ロール31～34が転写ベルト2'と接触する位置では、当該転写ベルト2'と感光体ドラム11～14は離れている。前記実施例と同様にニップ幅が0.5～2mm程度であり、上記各ニップ部中央と転写ロール31～34との離間距離dは、2～4mmプロセス方向下流に配置される。感光体ドラム11～14や転写ロール31～34の材料やサイズも前記実施例で説明したものと同様である。

【0109】本実施例によっても、転写ベルトと転写ロールの接触圧を大きくすることなく高画質の転写画像を得ることができる。また、転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高

カラー画像形成装置の説明としてのカラータンプリンターの要部構成を説明する模式図である。

【図2】 ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の一次転写部分の詳細構成を説明する要部構成図である。

【図3】 ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第二実施例としてのカラータンプリンの要部構成を説明する模式図である。

【図4】 第二実施例の一次転写部分の詳細構成を説明する要部構成図である。

【図5】 ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第三実施例としてのカラータンプリンの要部構成を説明する模式図である。

【図6】 第三実施例の一次転写部分の詳細構成を説明する要部構成図である。

【図7】 本発明によるカラータン画像形成装置の全体構成を説明する模式図である。

【図8】 感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第四実施例の要部構成を説明する模式図である。

【図9】 感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第五実施例の要部構成を説明する模式図である。

【図10】 感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第六実施例の要部構成を説明する模式図である。

【図11】 複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラータン画像形成装置に本発明を適用した本発明の第七実施例の全体構成を説明する模式図である。

【図12】 複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラータン画像形成装置に本発明を適用した本発明の第八実施例の全体構成を説明する模式図である。

【図13】 複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラータン画像形成装置に本発明を適用した本発明の第九実施例の全体構成を説明する模式図である。

【図14】 転写ニップ部の圧力とパッチパターン（まだら模様：mottle）転写時の転写むらの関係の説明図である。

【図15】 転写ニップ部の圧力と中抜け転写むらの関係の説明図である。

【図16】 本発明の第10の発明に対応する実施例の根拠の説明図である。

【図17】 ベルト部材に対して転写手段を非接触で設置する場合の両者の間の間隔設定を規定するための当該

（中間転写ベルト、転写手段）と転写手段（転写ロール、コロトロン）を非接触で設置した場合の間隔設定の根拠を説明するもので、ベルト部材と転写手段との間に形成する電界は $10\text{ V}/\mu\text{m}$ 程度が適正である。

【0121】 上記間隔が小さい程、上記の電界を維持するのための転写手段に印加する転写電圧は低く進む。しかし、上記の電界を維持して両者の間隔を $100\text{ }\mu\text{m}$ 以上になると、転写手段に印加する電圧は 1 kV を超えてしまい、転写手段からベルト部材に放電が生じ、画像が乱れてしまう。

【0122】 したがって、ベルト部材に転写ロールを非接触で配置した場合、両者の間隔を $100\text{ }\mu\text{m}$ 以下とする必要がある。転写手段をコロトロンとしたとき、コロトロン放電するコロトロンとベルト部材との間隔公差は大きくなら、 4 mm 以下となる。ただし、プレニップ部へのコロトロン放電の広がりを阻止するために、当該コロトロンの上流側放電部にパッチングを取り付ける必要がある。

【0123】 ところで、転写手段として転写ロールを用いる場合は、金属ロールとの通過している。上記したベルト部材との間隔を $100\text{ }\mu\text{m}$ 以下の精度に保つためには加工精度が高いく、金属製のロールを転写ロールとするのが良く、その直径は 20 mm 以下が適正であり、材質としてはアルミニウム、あるいはステンレス（SUS）が使用できる。

【0124】 また、この金属ロールの表面を高抵抗樹脂膜で被覆してもよい。高抵抗樹脂膜で表面を被覆すると、放電現象が発生し難くなる。上記の高抵抗樹脂膜としては、PFA、PVDF、ナイロン、PC（ポリカーボネート）が適しており、上記高抵抗樹脂膜の膜厚は $3\text{ }\mu\text{m}$ 乃至 $100\text{ }\mu\text{m}$ 、体積抵抗は 10^4 乃至 $10^9\text{ }\Omega\cdot\text{cm}$ 程度である。

【0125】 なお、ベルト部材が中間転写ベルトである場合の当該中間転写ベルトの表面抵抗は 10^{11} 乃至 $10^{13}\text{ }\Omega/\square$ が適当である。 $10^{11}\text{ }\Omega/\square$ 未満では電荷保持特性が悪く、画質劣化をもたらす。また、 $10^{13}\text{ }\Omega/\square$ を超えると、転写手段から転写ニップ部への電流が流れ難くなり、適正な転写が出来なくなる。

【0126】

【発明の効果】 以上説明したように、本発明によれば、潜像担持体上に形成した未定着トナー像を直接あるいは中間転写体を介して記録媒体に転写する画像形成装置において、転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされ、とくに、多色の重ね転写を行う画像形成装置では、多色転写されるトナー像の帯電量の差に起因する転写抜けや転写不足等の転写不良を解消して、高画質の転写画像を得ることができ、

【図面の簡単な説明】

【図1】 ベルト状の中間転写体を用いた本発明による

tile）転写時の転写むらの関係の説明図であって、横軸はニップ部の圧力（ニップ圧）（ g/cm ）を、縦軸は転写むら（転写むら）のグレースケールを示す。

【0115】 また、図15は転写ニップ部の圧力と中抜け転写むらの関係の説明図であって、横軸はニップ部の圧力（ニップ圧）（ g/cm ）を、縦軸はパッチパターン（転写むら）のグレースケールを示す。図14にはニップ圧が $10\text{ g}/\text{cm}$ 以上で転写むらの無い良好な転写が得られることが示され、図15ではニップ圧が $20\text{ g}/\text{cm}$ 以下で転写中抜けの無い良好な転写が得られることが示されている。したがって、ニップ圧は $10\text{ g}/\text{cm}$ 以上で $20\text{ g}/\text{cm}$ 以下とするのが望ましい。

【0116】 感光体ドラムとベルト部材とのニップ圧を 10 乃至 $20\text{ g}/\text{cm}$ に保つと、感光体ドラムとベルト部材とのニップ圧は 0.5 乃至 2 mm になる。このときのベルト部材のデフレーションは 3 乃至 $4\text{ k}\cdot\text{g}\cdot\text{f}$ である。転写性の面から考えると、感光体ドラムと転写ベルトとのニップ圧は 0.5 乃至 2 mm の範囲とするのが適当である。安定した転写を行うためには、ある程度のニップ圧が必要であり、 0.5 mm 以上あればよいが、ニップ圧が広過ぎると転写時に画像ずれが発生する。これは、感光体ドラムとベルト部材とを完全に等速にするとは異なるため、ベルト部材と感光体ドラムとの速度差をもったまま幅広で接していると、その接触域（ニップ幅）において画像ずれが生じる。

【0117】 前記本発明の第10の発明に対応する実施例では、感光体ドラムに対してベルト部材を予め非接触状態でしておき、転写ロールでベルト部材を持ち上げる

ことにより、感光体ドラムにベルト部材を接触させる構成としたものである。図16は第10の発明に対応する実施例の根拠の説明図であって、(a)は構成図、(b)はベルト部材（転写ベルト）の感光体ドラムへの食い込み量（mm）とニップ幅（mm）の関係の説明図である。

【0118】 図18(a)に示したように、ベルト部材2は時ローラ2a、2bに掛け渡された状態で感光体ドラム1とは非接触の位置にある。その後、転写ロール3を組み付けるときに当該転写ロール3でベルト部材2を感光体ドラム1方向に持ち上げて、当該ベルト部材を感光体ドラム1に接触させる。

【0119】 図18(b)に示されたように、感光体ドラムとベルト部材とのニップ幅の最速範囲は 0.5 乃至 2 mm であるが、そのニップ幅を保つことは困難である。例えば、直径 84 mm の感光体ドラムを用いた場合、上記のニップ幅を維持するためには感光体ドラムへのベルト部材の食い込み量が 0.01 以下にする必要がある。

【0120】 図17はベルト部材に対して転写手段を非接触で設置する場合の両者の間の間隔設定を規定するための当該設置間隔とブレイクダウン電圧（放電電圧： $\text{V}/\mu\text{m}$ ）の関係の説明図である。図18は、ベルト部材

画質の画像形成がなされる。図12は複色の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラータン画像形成装置に本発明を適用した本発明の第八実施例の全体構成を説明する模式図であって、転写ロール3、3'が転写ベルト2'の裏面に對して非接触で配置された点を除いて、前記第7実施例と同様の構成である。

【0110】 この実施例によっても、転写ベルトと転写ロールの間隔を大きくすることなく高画質の転写画像を得ることができる。また、転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。図13は複色の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラータン画像形成装置に本発明を適用した本発明の第九実施例の全体構成を説明する模式図であって、転写手段としてコロトロンを用いた点を除いて前記第8実施例と同様である。3'はコロトロン、図12と同一の符号は同一部分に対応する。

【0111】 本実施例では、感光体ドラム12、14に形成した静電潜像を現像装置14、14'でそれぞれの色トナーでトナー現像し、これを転写ベルト2'に搬送して搬送される記録媒体11上に転写する。この転写手段としてコロトロン3'を用いたものである。コロトロン3'はニップ部に中央から距離 d （ $2\sim 4\text{ mm}$ ）以下に設置される。コロトロン3'は転写ベルト2'とは非接触である。

【0112】 この実施例によっても、転写ベルトと転写ロールの接触圧を大きくすることなく高画質の転写画像を得ることができる。また、前記実施例と同様にコロトロン3'での転写電界に変動が生ぜず、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。以上説明した各実施例において、転写手段をニップ部の下流に設置し、かつベルト部材と接触した転写ロールの場合には、転写ロールからベルト部材を通してニップ部に電流が流れ、当該ニップ部に形成される電界により潜像担持体のトナー像を記録媒体に転写される。

【0113】 また、ベルト部材の中では、転写ニップ部と転写ロールの間に転写電界がかかっている。このため、直後のベルト部材上のトナーは剥離放電を受け、帯電料が増加する。なお、転写ロールをベルト部材に対して非接触で設置した場合も同様である。感光体ドラムと転写ロールをベルト部材に食い込ませると、感光体ドラムの振動や転写ロールの振動がベルト部材に伝わり、ベルト部材の駆動安定性が著しく悪化し、所謂バンディングの原因となる。

【0114】 そのため、本発明では、ベルト部材と転写ロールとを感光体ドラムに對して略々接線上に配置し、上記の問題の発生を防止するものである。図14は転写ニップ部の圧力とパッチパターン（まだら模様：mottle）

設置間隔とブレードダウン電界（放電電界： $V/\mu m$ ）の関係の説明図である。

【図18】 ベルト部材としてベルト状中間転写体を用いた画像形成装置の一例としてのカラープリンターの要部構成を説明する模式図である。

【図19】 中間転写ベルト上のトナー像の帯電量の推移の説明図である。

【図20】 中間転写ベルト上のトナー帯電量と最大二次転写電圧の関係の説明図である。

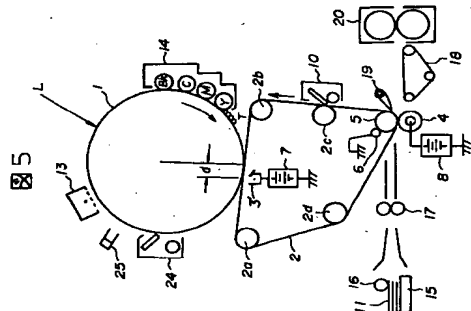
【図21】 従来技術に開示された一次転写部における感光体ドラムと中間転写ベルトおよび一次転写ロールの位置関係を説明する模式図である。

【図22】 中間転写ベルトと感光体ドラムとのニップ圧力と転写品質との関係の説明図である。

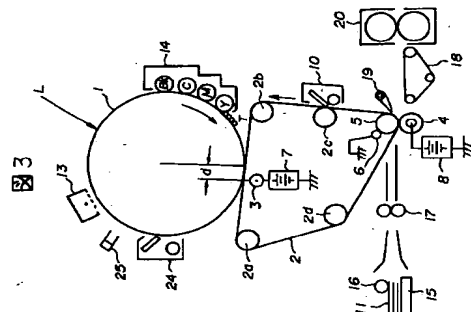
【符号の説明】

1・・・着像担持体（感光体ドラム）、2・・・ベルト部材（中間転写ベルト、転写ベルト、記録媒体搬送ベルト）、2aは駆動ロール、2b、2c・・・従動ロール、2d・・・テンションロール、3・・・一次転写ロール、3'・・・コロトロン、4・・・二次転写ロール、5・・・バックアップロール、6・・・コンタクトロール、7・・・一次転写電圧、8・・・二次転写電圧、10・・・中間転写ベルトリナー、11・・・転写紙等の記録媒体、13・・・帯電器、14・・・（カラー）現像装置、17・・・レジロール、18・・・記録媒体搬送ベルト、19・・・剥離爪、20・・・定着器、21・・・排出トレイ、24・・・感光体ドラムクリーナー、25・・・除電器。

【図5】

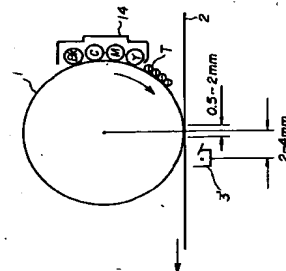


【図3】



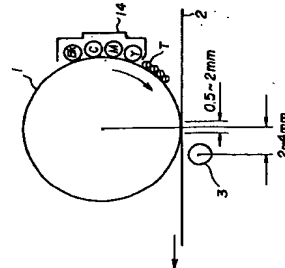
【図6】

【図7】

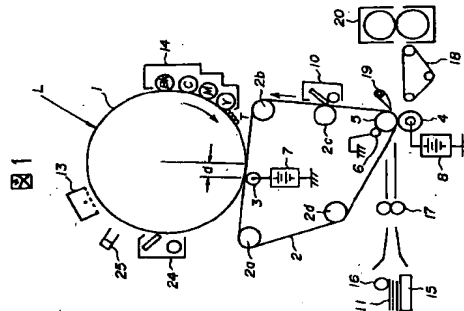


【図4】

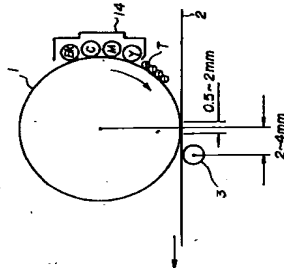
【図2】

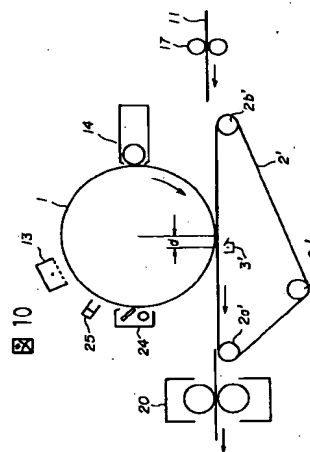
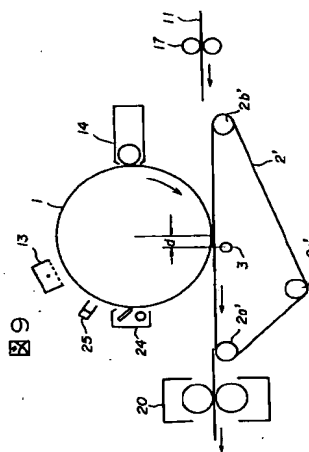
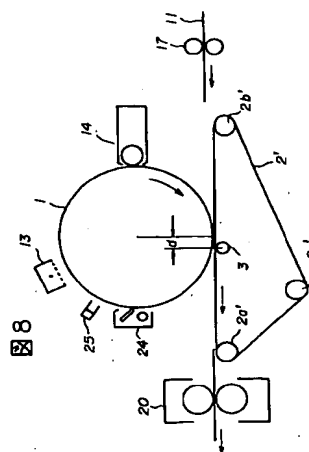
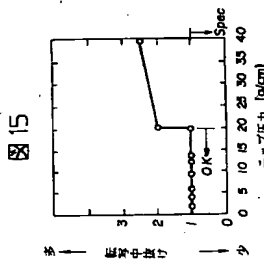
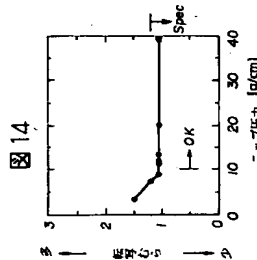
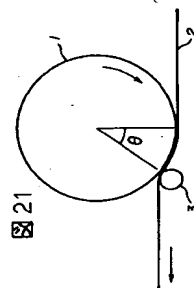
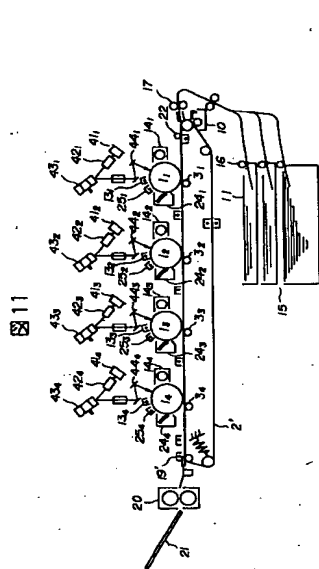


【図1】



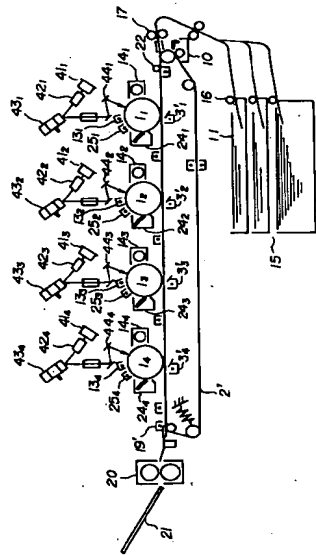
【図2】





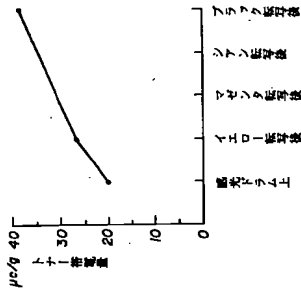
【図13】

図13



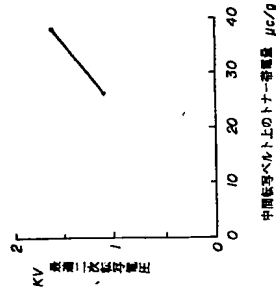
【図19】

図19



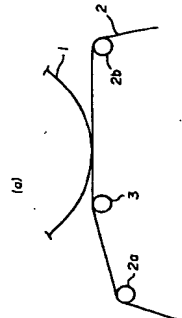
【図20】

図20



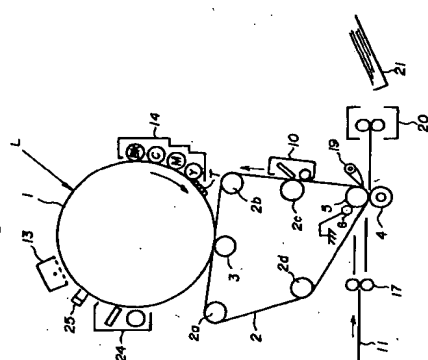
【図16】

図16



【図18】

図18



【図22】

図22

